FICHE DE DONNÉES DE SÉCURITÉ
conformément au Règlement (CE) No. 1907/2006

CITRIC ACID MONOHYDRATE

Version	Date de révision:	Numéro de la FDS:	Date d'impression: 14.04.2022
1.0	14.04.2022	500000026159	Date de dernière parution: -
			Date de la première version publiée: 14.04.2022

RUBRIQUE 1: Identification de la substance/du mélange et de la société/l'entreprise

1.1 Identificateur de produit

Nom commercial : CITRIC ACID MONOHYDRATE

Numéro d'Enregistrement REACH : 01-2119457026-42-XXXX

No.-CAS : 5949-29-1

1.2 Utilisations identifiées pertinentes de la substance ou du mélange et utilisations déconseillées

1.3 Renseignements concernant le fournisseur de la fiche de données de sécurité

Producteur, importateur, fournisseur :

Nordmann France SAS
1, Impasse des Marais
74940 Annecy-le-Vieux
France

Nordmann France SAS
1, Impasse des Marais
74940 Annecy-le-vieux
France

Emergency Telephone Numbers (24h):
Europe: +44 1235 239670
USA: +1 202 464 2554
Asia: +65 3158 1074

Nordmann, Rassmann GmbH
Kajen 2, 20459 Hamburg, Germany
T. +49 40 3687 0
info@nordmann.global

SUPPLIED BY NORDMANN

Téléphone : +33450095200

Téléfax : +33450095201

Adresse e-mail de la personne responsable de FDS : sds@nordmann.global

1.4 Numéro d'appel d'urgence

+33 (0)4 50 09 52 00
ORFILA (INRS) : + 33 (0)1 45 42 59 59
Centres Antipoison et de Toxicovigilance

ANGERS: 02 41 48 21 21
BORDEAUX: 05 56 96 40 80
LILLE: 0800 59 59 59
LYON: 04 72 11 69 11
MARSEILLE: 04 91 75 25 25
NANCY: 03 83 22 50 50
PARIS: 01 40 05 48 48
STRASBOURG: 03 88 37 37 37
TOULOUSE: 05 61 77 74 47

RUBRIQUE 2: Identification des dangers

2.1 Classification de la substance ou du mélange

Classification (RÈGLEMENT (CE) No 1272/2008)

Irritation oculaire, Catégorie 2	H319: Provoque une sévère irritation des yeux.
Toxicité spécifique pour certains organes cibles - exposition unique, Catégorie 3, Système respiratoire	H335: Peut irriter les voies respiratoires.

2.2 Éléments d'étiquetage

Étiquetage (RÈGLEMENT (CE) No 1272/2008)

Pictogrammes de danger :

Mention d'avertissement : Attention

Mentions de danger :
H319 Provoque une sévère irritation des yeux.
H335 Peut irriter les voies respiratoires.

Conseils de prudence :

Prévention:

P261 Éviter de respirer les poussières.
P280 Porter un équipement de protection des yeux/ du visage.

Intervention:

P304 + P340 + P312 EN CAS D'INHALATION: transporter la personne à l'extérieur et la maintenir dans une position où elle peut confortablement respirer. Appeler un CENTRE ANTIPOISON/ un médecin en cas de malaise.
P337 + P313 Si l'irritation oculaire persiste: consulter un médecin.

Stockage:

P403 + P233 Stocker dans un endroit bien ventilé. Maintenir le récipient fermé de manière étanche.

Elimination:

P501 Éliminer le contenu/ récipient dans une installation d'élimination des déchets agréée.

2.3 Autres dangers

Cette substance/ce mélange ne contient aucun ingrédient considéré comme persistant, bio-accumulable et toxique (PBT), ou très persistant et très bio-accumulable (vPvB) à des niveaux de 0,1% ou plus.

Informations écologiques: La substance/Le mélange ne contient pas de composants considérés comme ayant des propriétés perturbatrices du système endocrinien selon l'article 57(f) de REACH ou le règlement délégué de la Commission (UE) 2017/2100 ou le règlement de la Commission (EU) 2018/605 à des niveaux de 0,1 % ou plus.

Informations toxicologiques: La substance/Le mélange ne contient pas de composants considérés comme ayant des propriétés perturbatrices du système endocrinien selon l'article 57(f) de REACH ou le règlement délégué de la Commission (UE) 2017/2100 ou le règlement de la Commission (EU) 2018/605 à des niveaux de 0,1 % ou plus.

RUBRIQUE 3: Composition/informations sur les composants

3.1 Substances

No.-CAS : 5949-29-1

Composants

Nom Chimique	No.-CAS No.-CE	Concentration (% w/w)	Facteur M, SCL, ATE
Citric acid, monohydrate	5949-29-1	>= 90 - <= 100	

RUBRIQUE 4: Premiers secours

4.1 Description des premiers secours

Conseils généraux : Ne pas laisser la victime sans surveillance.

En cas d'inhalation : En cas d'inconscience, allonger en position latérale stable et appeler un médecin.
Si les troubles se prolongent, consulter un médecin.

En cas de contact avec la peau : Laver abondamment à l'eau.
Si les troubles se prolongent, consulter un médecin.

En cas de contact avec les yeux	:	Enlever les lentilles de contact. Protéger l'oeil intact. Si l'irritation oculaire persiste, consulter un médecin spécialiste.
En cas d'ingestion	:	Maintenir l'appareil respiratoire dégagé. Ne jamais rien faire avaler à une personne inconsciente. Si les troubles se prolongent, consulter un médecin.

4.2 Principaux symptômes et effets, aigus et différés

Symptômes	:	Irritation des yeux irritation des voies respiratoires
Risques	:	Provoque une sévère irritation des yeux. Peut irriter les voies respiratoires.

4.3 Indication des éventuels soins médicaux immédiats et traitements particuliers nécessaires

Traitement	:	Traiter de façon symptomatique.

RUBRIQUE 5: Mesures de lutte contre l'incendie

5.1 Moyens d'extinction

5.2 Dangers particuliers résultant de la substance ou du mélange

Produits de combustion dangereux	:	Oxydes de carbone

5.3 Conseils aux pompiers

Équipements de protection particuliers des pompiers	:	Porter un appareil de protection respiratoire autonome pour la lutte contre l'incendie, si nécessaire.
Information supplémentaire	:	Procédure standard pour feux d'origine chimique. Utiliser des moyens d'extinction appropriés aux conditions locales et à l'environnement proche.

RUBRIQUE 6: Mesures à prendre en cas de dispersion accidentelle

6.1 Précautions individuelles, équipement de protection et procédures d'urgence

Précautions individuelles	:	Éviter la formation de poussière.

6.2 Précautions pour la protection de l'environnement

Précautions pour la protection de l'environnement	:	Ne pas déverser dans des eaux de surface ou dans les égouts. En cas de pollution de cours d'eau, lacs ou égouts, informer les autorités compétentes conformément aux dispositions locales.

6.3 Méthodes et matériel de confinement et de nettoyage

Méthodes de nettoyage : Utiliser un équipement de manutention mécanique.
Ramasser et évacuer sans créer de poussière.
Balayer et enlever à la pelle.
Conserver dans des récipients adaptés et fermés pour l'élimination.

6.4 Référence à d'autres rubriques

Voir les rubriques: 7, 8, 11, 12 et 13.

RUBRIQUE 7: Manipulation et stockage

7.1 Précautions à prendre pour une manipulation sans danger

Conseils pour une manipulation sans danger : Pour l'équipement de protection individuel, voir rubrique 8.
Ne pas manger, fumer ou boire dans la zone de travail.

Indications pour la protection contre l'incendie et l'explosion : Prévoir une ventilation adéquate aux endroits où la poussière se forme.

Mesures d'hygiène : Pratiques générales d'hygiène industrielle.

7.2 Conditions d'un stockage sûr, y compris d'éventuelles incompatibilités

Exigences concernant les aires de stockage et les conteneurs : Les installations et le matériel électriques doivent être conformes aux normes techniques de sécurité.

Précautions pour le stockage en commun : Pas de matières à signaler spécialement.

Pour en savoir plus sur la stabilité du stockage : Pas de décomposition si le produit est entreposé et utilisé selon les prescriptions.

7.3 Utilisation(s) finale(s) particulière(s)

Utilisation(s) particulière(s) : Donnée non disponible

RUBRIQUE 8: Contrôles de l'exposition/protection individuelle

8.1 Paramètres de contrôle

Ne contient pas de substances avec des valeurs limites d'exposition professionnelle.

8.2 Contrôles de l'exposition

Équipement de protection individuelle

Protection des yeux : Lunettes de sécurité avec protections latérales

Protection des mains

Matériel	:	Gants résistants aux solvants
Remarques	:	Prenez en compte l'information donnée par le fournisseur concernant la perméabilité et les temps de pénétration, et les conditions particulières du lieu de travail (contraintes mécaniques, temps de contact). Le temps de pénétration peut être obtenu du fournisseur de gants de protection et il doit en être tenu compte. Veuillez observer les instructions concernant la perméabilité et le délai de rupture de la matière qui sont fournies par le fournisseur de gants. Prendre également en considération les conditions locales spécifiques dans lesquelles le produit est utilisé, telles que le risque de coupures, d'abrasion et le temps de contact. Mesures de prévention recommandées pour la protection de la peau Nettoyer soigneusement la peau après tout contact avec le produit. Il convient de discuter au préalable avec le fournisseur des gants de protection si ceux-ci sont bien adaptés à un poste de travail spécifique.
Protection de la peau et du corps	:	Uniforme de travail ou veste de laboratoire.
Protection respiratoire	:	Utiliser une protection respiratoire adéquate sauf en présence d'une ventilation locale par aspiration ou s'il est démontré que l'exposition est dans les limites préconisées par les directives d'exposition. L'équipement doit être conforme à l'EN 143
Filtre de type	:	Type protégeant des particules (P)

RUBRIQUE 9: Propriétés physiques et chimiques

9.1 Informations sur les propriétés physiques et chimiques essentielles

Etat physique	:	Poudre cristalline
Couleur	:	blanc
Odeur	:	inodore
Point/intervalle de fusion	:	153 °C
Point/intervalle d'ébullition	:	Donnée non disponible
Inflammabilité	:	Ne brûle pas
Limite d'explosivité, supérieure / Limite d'inflammabilité supérieure	:	Donnée non disponible
Limite d'explosivité, inférieure	:	Donnée non disponible

/ Limite d'inflammabilité inférieure		
Point d'éclair	:	Donnée non disponible
Température d'auto-inflammabilité	:	non déterminé
Température de décomposition	:	> 175 °C
pH	:	Donnée non disponible
Viscosité		
Viscosité, dynamique	:	Donnée non disponible
Viscosité, cinématique	:	Donnée non disponible
Solubilité(s)		
Hydrosolubilité	:	592 g/l (20 °C)
Coefficient de partage: n-octanol/eau	:	Donnée non disponible
Pression de vapeur	:	Donnée non disponible
Densité relative	:	1,665
Densité	:	1,67 g/cm3

9.2 Autres informations

Donnée non disponible

RUBRIQUE 10: Stabilité et réactivité

10.1 Réactivité

Pas de décomposition si le produit est entreposé et utilisé selon les prescriptions.

10.2 Stabilité chimique

Pas de décomposition si le produit est entreposé et utilisé selon les prescriptions.

10.3 Possibilité de réactions dangereuses

Réactions dangereuses	:	Pas de réactions dangereuses connues dans les conditions normales d'utilisation.

10.4 Conditions à éviter

Conditions à éviter	:	Surface (s) chaude (s) Chaleur, flammes et étincelles.

10.5 Matières incompatibles

Matières à éviter : Acides forts et bases fortes

10.6 Produits de décomposition dangereux

Dioxyde de carbone (CO_2)
Oxydes de carbone

RUBRIQUE 11: Informations toxicologiques

11.1 Informations sur les classes de danger telles que définies dans le règlement (CE) no 1272/2008

Toxicité aiguë
Non classé sur la base des informations disponibles.

Corrosion cutanée/irritation cutanée
Non classé sur la base des informations disponibles.

Lésions oculaires graves/irritation oculaire
Provoque une sévère irritation des yeux.

Sensibilisation respiratoire ou cutanée

Sensibilisation cutanée
Non classé sur la base des informations disponibles.

Sensibilisation respiratoire
Non classé sur la base des informations disponibles.

Mutagénicité sur les cellules germinales
Non classé sur la base des informations disponibles.

Cancérogénicité
Non classé sur la base des informations disponibles.

Toxicité pour la reproduction
Non classé sur la base des informations disponibles.

Toxicité spécifique pour certains organes cibles - exposition unique
Non classé sur la base des informations disponibles.

Toxicité spécifique pour certains organes cibles - exposition répétée
Non classé sur la base des informations disponibles.

Toxicité par aspiration
Non classé sur la base des informations disponibles.

11.2 Informations sur les autres dangers

Propriétés perturbant le système endocrinien

Produit:

Evaluation : La substance/Le mélange ne contient pas de composants considérés comme ayant des propriétés perturbatrices du système endocrinien selon l'article 57(f) de REACH ou le rè-

glement délégué de la Commission (UE) 2017/2100 ou le règlement de la Commission (EU) 2018/605 à des niveaux de 0,1 % ou plus.

Information supplémentaire

Produit:

Remarques : Donnée non disponible

RUBRIQUE 12: Informations écologiques

12.1 Toxicité

Donnée non disponible

12.2 Persistance et dégradabilité

Donnée non disponible

12.3 Potentiel de bioaccumulation

Donnée non disponible

12.4 Mobilité dans le sol

Donnée non disponible

12.5 Résultats des évaluations PBT et vPvB

Produit:

Evaluation : Cette substance/ce mélange ne contient aucun ingrédient considéré comme persistant, bio-accumulable et toxique (PBT), ou très persistant et très bio-accumulable (vPvB) à des niveaux de 0,1% ou plus.

12.6 Propriétés perturbant le système endocrinien

Produit:

Evaluation : La substance/Le mélange ne contient pas de composants considérés comme ayant des propriétés perturbatrices du système endocrinien selon l'article 57(f) de REACH ou le règlement délégué de la Commission (UE) 2017/2100 ou le règlement de la Commission (EU) 2018/605 à des niveaux de 0,1 % ou plus.

12.7 Autres effets néfastes

Produit:

Information écologique supplémentaire : Donnée non disponible

RUBRIQUE 13: Considérations relatives à l'élimination

13.1 Méthodes de traitement des déchets

Produit : Le code de déchet doit être attribué par l'utilisateur, si possible en accord avec les autorités responsables pour l'élimination des déchets.
Éliminer conformément aux Directives Européennes sur les déchets et les déchets dangereux.

Emballages contaminés : Les conteneurs vides doivent être acheminés vers un site agréé pour le traitement des déchets à des fins de recyclage ou d'élimination.

RUBRIQUE 14: Informations relatives au transport

14.1 Numéro ONU ou numéro d'identification

Non réglementé comme étant une marchandise dangereuse

14.2 Désignation officielle de transport de l'ONU

Non réglementé comme étant une marchandise dangereuse

14.3 Classe(s) de danger pour le transport

Non réglementé comme étant une marchandise dangereuse

14.4 Groupe d'emballage

Non réglementé comme étant une marchandise dangereuse

14.5 Dangers pour l'environnement

Non réglementé comme étant une marchandise dangereuse

14.6 Précautions particulières à prendre par l'utilisateur

Non applicable

14.7 Transport maritime en vrac conformément aux instruments de l'OMI

Non applicable pour le produit tel qu'il est fourni.

RUBRIQUE 15: Informations relatives à la réglementation

15.1 Réglementations/législation particulières à la substance ou au mélange en matière de sécurité, de santé et d'environnement

REACH - Restrictions applicables à la fabrication, la mise sur le marché et l'utilisation de certaines substances et préparations dangereuses et de certains articles dangereux (Annexe XVII) : Non applicable

REACH - Listes des substances extrêmement préoccupantes candidates en vue d'une autorisation (Article 59). : Non applicable

Règlement (CE) Nº 1005/2009 relatif à des substances qui appauvrissent la couche d'ozone : Non applicable

Règlement (UE) 2019/1021 concernant les polluants organiques persistants (refonte)	:	Non applicable
Règlement (CE) Nº 649/2012 du Parlement européen et du Conseil concernant les exportations et importations de produits chimiques dangereux	:	Non applicable
REACH - Liste des substances soumises à autorisation (Annexe XIV)	:	Non applicable
Seveso III: Directive 2012/18/UE du Parlement européen et du Conseil concernant la maîtrise des dangers liés aux accidents majeurs impliquant des substances dangereuses.		Non applicable
Maladies Professionnelles (R-461-3, France)	:	Non applicable
Surveillance médicale renforcée (R4624-18)	:	Le produit n'a pas de propriétés CMR
Composés organiques volatils	:	Directive 2010/75/UE du Parlement européen et du Conseil du 24 novembre 2010 relative aux émissions industrielles (prévention et réduction intégrées de la pollution) Non applicable

15.2 Évaluation de la sécurité chimique

Une Évaluation de la Sécurité Chimique a été faite pour cette substance.

RUBRIQUE 16: Autres informations

Texte complet pour autres abréviations

ADN - Accord européen relatif au transport international des marchandises dangereuses par voies de navigation intérieures; ADR - Accord européen relatif au transport international des marchandises dangereuses par la route; AIIC - Inventaire australien des produits chimiques industriels; ASTM - Société américaine pour les essais de matériaux; bw - Poids corporel; CLP - Règlement relatif à la classification, à l'étiquetage et à l'emballage des substances; règlement (CE) n° 1272/2008; CMR - Cancérogène, mutagène ou toxique pour la reproduction; DIN - Norme de l'Institut allemand de normalisation; DSL - Liste nationale des substances (Canada); ECHA - Agence européenne des produits chimiques; EC-Number - Numéro de Communauté européenne; ECx - Concentration associée à x % de réponse; ELx - Taux de charge associée à x % de réponse; EmS - Horaire d'urgence; ENCS - Substances chimiques existantes et substances nouvelles (Japon); ErCx - Concentration associée à une réponse de taux de croissance de x %; GHS - Système général harmonisé; GLP - Bonnes pratiques de laboratoire; IARC - Centre international de recherche sur le cancer; IATA - Association du transport aérien international; IBC - Code international pour la construction et l'équipement des navires transportant des produits chimiques dangereux en vrac; IC50 - Concentration inhibitrice demi maximale; ICAO - Organisa-

tion de l'aviation civile internationale; IECSC - Inventaire des substances chimiques existantes en Chine; IMDG - Marchandises dangereuses pour le transport maritime international; IMO - Organisation maritime internationale; ISHL - Sécurité industrielle et le droit de la santé (Japon); ISO - Organisation internationale de normalisation; KECI - Inventaire des produits chimiques coréens existants; LC50 - Concentration létale pour 50 % d'une population test; LD50 - Dose létale pour 50 % d'une population test (dose létale moyenne); MARPOL - Convention internationale pour la prévention de la pollution par les navires; n.o.s. - Non spécifié; NO(A)EC - Effet de concentration non observé (négatif); NO(A)EL - Effet non observé (nocif); NOELR - Taux de charge sans effet observé; NZIoC - Inventaire des produits chimiques en Nouvelle-Zélande; OECD - Organisation pour la coopération économique et le développement; OPPTS - Bureau de la sécurité chimique et prévention de la pollution; PBT - Persistant, bio-accumulable et toxique; PICCS - Inventaire des produits et substances chimiques aux Philippines; (Q)SAR - Relations structure-activité (quantitative); REACH - Règlement (CE) n° 1907/2006 du Parlement européen et du Conseil concernant l'enregistrement, l'évaluation, l'autorisation et la restriction des produits chimiques; RID - Règlement concernant le transport international des marchandises dangereuses par chemin de fer; SADT - Température de décomposition auto-accélérée; SDS - Fiche de Données de Sécurité; SVHC - substance extrêmement préoccupante; TCSI - Inventaire des substances chimiques à Taiwan; TECI - Répertoire des produits chimiques existants en Thaïlande; TRGS - Règle technique pour les substances dangereuses; TSCA - Loi sur le contrôle des substances toxiques (États-Unis); UN - Les Nations Unies; vPvB - Très persistant et très bioaccumulable

Information supplémentaire

Les informations contenues dans la présente fiche de sécurité ont été établies sur la base de nos connaissances à la date de publication de ce document. Ces informations ne sont données qu'à titre indicatif en vue de permettre des opérations de manipulation, fabrication, stockage, transport, distribution, mise à disposition, utilisation et élimination dans des conditions satisfaisantes de sécurité, et ne sauraient donc être interprétées comme une garantie ou considérées comme des spécifications de qualité. Ces informations ne concernent en outre que le produit nommément désigné et, sauf indication contraire spécifique, peuvent ne pas être applicables en cas de mélange dudit produit avec d'autres substances ou utilisables pour tout procédé de fabrication.

FR / FR

Annex: Exposure Scenarios

9.1 Exposure scenario 2: Formulation or re-packing - Formulation of citric acid into preparations

Market sector: Generic formulation of citric acid into preparations
Product category formulated: PC 1: Adhesives, Sealants; PC 3: Air care products; PC 9a: Coatings and Paints, Thinners, paint removers; PC 12: Fertilizers; PC 30: Photo-chemicals; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 39: Cosmetics, personal care products

Environment contributing scenario(s):		
CS 1	Formulation of citric acid into preparations	ERC 2
CS 2	Formulation into solid matrix	ERC 3
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 6	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 7	Mixing or blending in batch processes; Liquid	PROC 5
CS 8	Industrial spraying; Liquid	PROC 7
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 11	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 12	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 13	Laboratory chemicals; Liquid	PROC 15
CS 14	Manual activities involving hand contact; Liquid	PROC 19
CS 15	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 16	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 17	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 18	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 19	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 20	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a

CS 21	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 22	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness	PROC 9
CS 23	Laboratory chemicals; Solid, medium dustiness	PROC 15
CS 24	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

Citric acid is formulated into a wide range of products, often at specialist formulation sites. The processes and exposures are expected to be broadly similar across different industries. Formulation is generally carried out in batch processes, which may be open or closed; several steps may be involved.

9.1.1 Env CS 1: Formulation of citric acid into preparations (ERC 2)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.2 Env CS 2: Formulation into solid matrix (ERC 3)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.1.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)

9.1.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.1.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.5 Worker CS 5: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.1.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.6 Worker CS 6: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.1.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.7 Worker CS 7: Mixing or blending in batch processes; Liquid (PROC 5)

9.1.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.8 Worker CS 8: Industrial spraying; Liquid (PROC 7)

9.1.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.1.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.1.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.11 Worker CS 11: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.1.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.12 Worker CS 12: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.1.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.13 Worker CS 13: Laboratory chemicals; Liquid (PROC 15)

9.1.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.13.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.14 Worker CS 14: Manual activities involving hand contact; Liquid (PROC 19)

9.1.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm^2)	

9.1.14.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.15 Worker CS 15: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.1.15.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.16 Worker CS 16: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.1.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.17 Worker CS 17: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.1.17.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.17.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.18 Worker CS 18: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.1.18.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *(Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.18.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.19 Worker CS 19: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.1.19.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.19.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.20 Worker CS 20: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.1.20.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.20.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.21 Worker CS 21: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.1.21.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.21.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.22 Worker CS 22: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, medium dustiness (PROC 9)

9.1.22.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.22.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.9 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.23 Worker CS 23: Laboratory chemicals; Solid, medium dustiness (PROC 15)

9.1.23.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.1.23.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.10 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.1.24 Worker CS 24: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.1.24.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm^2)	

9.1.24.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.1.11 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2 Exposure scenario 3: Use at industrial sites - Use of citric acid as a chemical intermediate

Market sector: Use of citric acid as a chemical intermediate
Product category used: PC 0: Other
Sector of use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals

Environment contributing scenario(s):		
CS 1	Use of citric acid as a chemical intermediate	ERC 6a
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 3	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 4	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid may be used as an intermediate in the formation of:
- Metal-salts, such as magnesium citrate, iron citrate or zinc citrate.
- Others salts, for example ammonium citrate.
- Esters such as triethyl citrate or tributyl citrate.

In a typical process for the production of citrate salts, citric acid is dissolved in deionised water. Addition of a source of the other ion results in conversion of citric acid to its salt. The salt is separated by evaporation and centrifugation, then dried, sieved and bagged.
The reactions may take place in a closed batch or continuous process with occasional opportunities for exposure arising, for example, during sampling.

9.2.1 Env CS 1: Use of citric acid as a chemical intermediate (ERC 6a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.2.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.2.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Closed process with no likelihood of exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.3 Worker CS 3: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.2.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.4 Worker CS 4: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.2.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.2.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.2.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.2.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required for qualitative assessment due to STOT SE 3 inhalation hazard.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.2.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.2.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.3 Exposure scenario 4: Use at industrial sites - Industrial use of citric acid in detergent and cleaning products

Market sector: Use of citric acid in detergent and cleaning products
Product category used: PC 3: Air care products; PC 28: Perfumes, Fragrances; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 8	Roller application or brushing; Liquid	PROC 10
CS 9	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 10	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness	PROC 2
CS 11	Chemical production where opportunity for exposure arises; Solid, low dustiness	PROC 4
CS 12	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness	PROC 8a
CS 13	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness	PROC 8b
CS 14	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness	PROC 9

Further description of the use:

Citric acid and its salts are used in a wide variety of cleaning and maintenance products for industrial and professional uses.
The main use or function of citric acid and its salts in detergents and cleaning products is as a complexing agent/ sequestering builders to remove water hardness minerals and ‘build’ the cleaning efficiency of the surfactant. They can also function as additives (e.g. in hand-washing liquids [RIVM, 2006]) or acids (*e.g.*, in bathroom/ toilet cleaning liquids or silver polish).

Technical applications of citric acid and its salts in various industries as a complex-forming agent, cleaning agent, softening agent, decalcifying agent, de-rusting agent, corrosive agent and synergist in antioxidant mixtures accounted for 20% of the total production volume (500 000 tons/annum) in Europe (including Eastern Europe and Israel) in 1999 [HERA, 2005]. The total consumption of citric acid in household cleaning applications in the EEA (*i.e.*, EU + Iceland, Switzerland and Norway) in 2002 was 103 000 tons [HERA, 2005].
The concentration of citrate used in these applications varies. Concentrations of citrate (citric acid or trisodium citrate) in the most important consumer products are estimated as follows:
Dishwasher Tablets up to *approx.* 40%
Dishwashing machine cleaner solid and liquid up to 70%
Descaler solid and liquid up to 70 %
Dishwasher Rinse Aids 0.5 - 5 %
Fabric care powder (phosphonate free) 2- 30%
Liquid fabric care (phosphonate free) 2 - 10%
Bath room cleaner, all purpose cleaner up to 10 %
Toilet bowl cleaner up to 10 %CAA

9.3.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.3.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.3.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC

(No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.3.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.3.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.3.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined

concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.3.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.7 Worker CS 7: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.3.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.8 Worker CS 8: Roller application or brushing; Liquid (PROC 10)

9.3.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.9 Worker CS 9: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.3.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.10 Worker CS 10: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, low dustiness (PROC 2)

9.3.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	4E-3 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.11 Worker CS 11: Chemical production where opportunity for exposure arises; Solid, low dustiness (PROC 4)

9.3.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.12 Worker CS 12: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, low dustiness (PROC 8a)

9.3.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.13 Worker CS 13: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, low dustiness (PROC 8b)

9.3.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.3.14 Worker CS 14: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Solid, low dustiness (PROC 9)

9.3.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.3.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.3.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4 Exposure scenario 5: Widespread use by professional workers - Professional use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products
Product category used: PC 3: Air care products; PC 31: Polishes and Wax Blends; PC 35: Washing and Cleaning Products; PC 36: Water softeners

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 3	Widespread use of functional fluid (indoor)	ERC 9a
CS 4	Widespread use of functional fluid (outdoor)	ERC 9b
Worker contributing scenario(s):		
CS 5	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 6	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 7	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 8	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 9	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 10	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 11	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 12	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 13	Manual activities involving hand contact; Indoor use; Solid, low dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, low dustiness	PROC 19

Further description of the use:

This scenario covers professional use of citric acid in cleaning products.
The large number of household products includes, but is not limited to:
· Laundry products: These include detergent powders, detergent liquids, laundry pre-treatment products and fabric softeners.
· Dish washing products: These are hand dishwashing liquids and machine dishwashing products (dishwashing powders/detergents and dishwashing liquids/rinse aids).
· All purpose cleaners: These are used in cleaning hard surfaces like windows, mirrors, wood, floors and tiled walls [RIVM, 2006]. The products can be liquid cleaners, spray cleaners or wet tissue application.
· Abrasive cleaners: These are used in remove soil which is firmly attached to the surface (e.g. lavatory pan, washbasins and kitchen sink/ working top) and can be powders, liquids or scouring pads [RIVM, 2006]
· Sanitary products: These are bathroom cleaners (sprays and liquids) and toilet cleaners.

· Floor, carpet and furniture products: These are products that provide a combined effect of cleaning and polishing.
· Metal polish: Consumer or professional use of, *e.g.*, silver polishes, either ready-to-use or solid preparations which need to be dissolved in water.
· Water treatment/scale inhibition products for household appliances.
· Vehicle care products.

9.4.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.3 Env CS 3: Widespread use of functional fluid (indoor) (ERC 9a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.4 Env CS 4: Widespread use of functional fluid (outdoor) (ERC 9b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.4.5 Worker CS 5: Roller application or brushing; Indoor use; Liquid (PROC 10)

9.4.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.6 Worker CS 6: Roller application or brushing; Outdoor use; Liquid (PROC 10)

9.4.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.7 Worker CS 7: Non-industrial spraying; Indoor use; Liquid (PROC 11)

9.4.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.8 Worker CS 8: Non-industrial spraying; Outdoor use; Liquid (PROC 11)

9.4.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.9 Worker CS 9: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.4.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid *Product ingredients mixed, diluted and/or suspended*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP

Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.10 Worker CS 10: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.4.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.11 Worker CS 11: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.4.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.11.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.12 Worker CS 12: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.4.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.12.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or

inhalation exposure to citric acid.

9.4.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, low dustiness (PROC 19)

9.4.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.4.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, low dustiness (PROC 19)

9.4.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form) *e.g. Detergent powders and tablets*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.4.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.4.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The Concentration limit for an ingredient in a mixture that is classified as eye irritation Category 2 for effects on the eye (Causes serious eye irritation, H319) is 10% according to Table 3.3.5 in CLP Regulation EC (No) 1272/2008. The classification of STOT-SE Category 3 does not have a defined concentration limit. However, Aageneric concentration limit of 20 % is appropriate; as an additive of all Category 3 ingredients for each endpoint according to section 3.8.3.4.5 in CLP Regulation EC (No) 1272/2008. It is therefore considered that there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5 Exposure scenario 6: Consumer use - Consumer use of citric acid in cleaning products

Market sector: Use of citric acid in detergent and cleaning products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Air care products	PC 3
CS 4	Polishes and wax blends	PC 31
CS 5	Washing and cleaning products	PC 35
CS 6	Water Softeners	PC 36

Further description of the use:

This scenario covers consumer use of citric acid in cleaning products.

9.5.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.5.3 Cons CS 3: Air care products (PC 3)

9.5.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.4 Cons CS 4: Polishes and wax blends (PC 31)

9.5.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.5 Cons CS 5: Washing and cleaning products (PC 35)

9.5.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.5.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory

tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.5.6 Cons CS 6: Water Softeners (PC 36)

9.5.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.5.6.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.6 Exposure scenario 7: Widespread use by professional workers - Professional use of personal care products

Market sector: Personal care use
Product category used: PC 39: Cosmetics, personal care products

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Worker contributing scenario(s):		
CS 2	Cosmetics, personal care products; Professional use	PROC 0

Further description of the use:

This scenario covers professional use of personal care products.
Citric acid and its salts are used in a wide range of personal care products, including:· Shampoos and conditioners· Astringent lotions· Bubble baths· Creams and lotions· Facial cleaners· Feminine hygiene products· Permanent wave neutraliser· Propellants for aerosol-type dispensers· Toothpastes· Mouth rinses· Body wash/cleanser· Hair colour and bleaching· Moisturisers· Hand soaps· Nail polish· Anti-aging productsIn these products, citric acid acts as clarifying agents, water softeners, buffers, foam boosters and stabilizers, complexing agents (for example to stabilize the formulation by complexing metal ions and preventing discoloration and decomposition).The human health effects of the end us of these products is exempt from REACH, however, the environmental impact must be assessed.

9.6.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.6.2 Worker CS 2: Cosmetics, personal care products; Professional use (PROC 0)

9.6.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario.

9.6.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The human health assessment is not considered for professional use of personal care products, since these are outside the scope of REACH.

9.7 Exposure scenario 8: Consumer use - Consumer use of personal care products

Market sector: Personal care use

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Cosmetics, personal care products; Consumer use	PC 39

Further description of the use:

This scenario covers consumer use of personal care products.

9.7.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.7.2 Cons CS 2: Cosmetics, personal care products; Consumer use (PC 39)

The human health assessment is not considered for consumer use of personal care products, since these are outside the scope of REACH.

9.7.2.1 Conditions of use

Conditions of use were not defined for this contributing scenario.Outside the scope of REACH.

9.7.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients as in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.8 Exposure scenario 9: Use at industrial sites - Use in the Paper industry

Market sector: Use in the Paper industry
Product category used: PC 26: Paper and board treatment products
Sector of use: SU 6b: Manufacture of pulp, paper and paper products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid is used in the cleaning of papermaking machines and to prevent build up of deposits. Cleaning applications are covered under another exposure scenario; this scenario covers use of citric acid as an additive or processing aid in the paper-making industry.
Citric acid may be added to pulp slurry prior to bleaching to control paper staining by sequestering metal ions. Bleaching of pulp is usually carried out in several stages, typically 3-5. Each stage typically contains pumps, mixers, a washer, and a retention tower. Citric acid may be added prior to one or more stages. Opportunities for exposure may arise during mixing/blending and transfer operations.
It is possible that a small amount of citric acid is incorporated into the finished paper products. However, it is considered that releases from these products will be minimal compared to those from the paper manufacturing process and release from articles is not considered in this scenario.
Citric acid may also be used as additives in paper products, such as tobacco papers. The human health and environmental exposures resulting from use as an additive in paper-making are expected to be equivalent to or less than the exposures resulting from use as a processing aid in the paper industry. Therefore, the same exposure scenario is considered adequate to cover both uses. The human health aspects of end use effects of tobacco products are outside the scope of this assessment. Environmental exposures to citric acid resulting from this end use are not expected to be significant compared to losses from other sources examined in the exposure scenarios of this report and are not considered further.

9.8.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.8.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.8.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.8.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: Yes (TRA effectiveness) [Effectiveness Inhalation: 90%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)

9.8.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*.	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.8.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid substance*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.8.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.8.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid substance*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.8.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.8.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.9 Exposure scenario 10: Use at industrial sites - Use in cement retardation products

Market sector: Use in cement retardation products
Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Industrial spraying; Liquid	PROC 7
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 7	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness	PROC 2
CS 8	Chemical production where opportunity for exposure arises; Solid, high dustiness	PROC 4
CS 9	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness	PROC 8a
CS 10	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness	PROC 8b

Subsequent service life exposure scenario(s):
ES13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Further description of the use:

Citric acid can be used to retard the setting rate of cement and reduce the amount of water needed. They may therefore be added to concrete, mortar, plaster, sealant and render formulations. The concentration of citric acid in these products is generally low (<1%).
Citric acid may be used in construction materials in industrial settings. This may include: mixing of citric acid (generally as part of a solid formulation) with cement and other ingredients to form concrete, mortar, plaster or render; and spreading, moulding or spraying of the product.
Cement-products containing citric acid may be used by members of the public (consumer use) and by workers at the commercial level e.g. skilled trades (professional use). This may include mixing, spreading, moulding or spraying operations. The citric acid may form part of a solid or liquid formulation.
Citric acid will remain in the concrete, mortar, plaster or render during its service life. Release is not intended, however, limited exposure is possible.
Both indoor and outdoor use of the formulations and articles is possible.

9.9.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.9.2 Worker CS 2: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.9.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.9.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.4 Worker CS 4: Industrial spraying; Liquid (PROC 7)

9.9.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.9.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for

substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.9.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.7 Worker CS 7: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, high dustiness (PROC 2)

9.9.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed continuous process with occasional controlled exposure	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.8 Worker CS 8: Chemical production where opportunity for exposure arises; Solid, high dustiness (PROC 4)

9.9.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, high dustiness (PROC 8a)

9.9.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.9.10 Worker CS 10: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, high dustiness (PROC 8b)

9.9.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.9.10.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.9.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10 Exposure scenario 11: Widespread use by professional workers - Professional use in cement retardation products

Market sector: Use in cement retardation products
Product category used: PC 0: Other

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Indoor use; Liquid	PROC 10
CS 4	Roller application or brushing; Outdoor use; Liquid	PROC 10
CS 5	Non-industrial spraying; Indoor use; Liquid	PROC 11
CS 6	Non-industrial spraying; Outdoor use; Liquid	PROC 11
CS 7	Treatment of articles by dipping and pouring; Indoor use; Liquid	PROC 13
CS 8	Treatment of articles by dipping and pouring; Outdoor use; Liquid	PROC 13
CS 9	Manual activities involving hand contact; Indoor use; Liquid	PROC 19
CS 10	Manual activities involving hand contact; Outdoor use; Liquid	PROC 19
CS 11	Tabletting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness	PROC 14
CS 12	Tabletting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness	PROC 14
CS 13	Manual activities involving hand contact; Indoor use; Solid, high dustiness	PROC 19
CS 14	Manual activities involving hand contact; Outdoor use; Solid, high dustiness	PROC 19
CS 15	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness	PROC 21
CS 16	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness	PROC 21

Subsequent service life exposure scenario(s):
ES14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Further description of the use:

This scenario cover professional use in cement retardation products.

9.10.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.10.3 Worker CS 3: Roller application or brushing; Indoor use; Liquid (PROC 10)

9.10.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.4 Worker CS 4: Roller application or brushing; Outdoor use; Liquid (PROC 10)

9.10.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.5 Worker CS 5: Non-industrial spraying; Indoor use; Liquid (PROC 11)

9.10.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.6 Worker CS 6: Non-industrial spraying; Outdoor use; Liquid (PROC 11)

9.10.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	56 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.7 Worker CS 7: Treatment of articles by dipping and pouring; Indoor use; Liquid (PROC 13)

9.10.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.8 Worker CS 8: Treatment of articles by dipping and pouring; Outdoor use; Liquid (PROC 13)

9.10.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable

risk to humans from eye or inhalation exposure to citric acid.

9.10.9 Worker CS 9: Manual activities involving hand contact; Indoor use; Liquid (PROC 19)

9.10.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.10 Worker CS 10: Manual activities involving hand contact; Outdoor use; Liquid (PROC 19)

9.10.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.11 Worker CS 11: Tabletting, compression, extrusion, pelettisation, granulation; Indoor use; Solid, high dustiness (PROC 14)

9.10.11.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as best practice for handling a very dusty solid.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.11.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.12 Worker CS 12: Tabletting, compression, extrusion, pelettisation, granulation; Outdoor use; Solid, high dustiness (PROC 14)

9.10.12.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.12.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.13 Worker CS 13: Manual activities involving hand contact; Indoor use; Solid, high dustiness (PROC 19)

9.10.13.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.13.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	20 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.14 Worker CS 14: Manual activities involving hand contact; Outdoor use; Solid, high dustiness (PROC 19)

9.10.14.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.14.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.6 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	14 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.15 Worker CS 15: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid, high dustiness (PROC 21)

9.10.15.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.15.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.7 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	8 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.10.16 Worker CS 16: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid, high dustiness (PROC 21)

9.10.16.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (very dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.10.16.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.10.8 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	5.6 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11 Exposure scenario 12: Consumer use - Consumer use in Cement retardation products

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
CS 2	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
Consumer contributing scenario(s):		
CS 3	Cement retardation products; indoor use	PC 0
CS 4	Cement retardation products; outdoor use	PC 0

Subsequent service life exposure scenario(s):
ES15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Further description of the use:

This scenario covers consumer use in cement retardation products.

9.11.1 Env CS 1: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.2 Env CS 2: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.11.3 Cons CS 3: Cement retardation products; indoor use (PC 0)

9.11.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.11.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.11.4 Cons CS 4: Cement retardation products; outdoor use (PC 0)

9.11.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.11.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12 Exposure scenario 13: Service life (worker at industrial site) - Service life of articles; cement retardation product; industrial use

Market sector: Use in cement retardation products
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use; Solid	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use; Solid	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES10: Use at industrial sites - Use in cement retardation products

Further description of the use:

This scenario covers the industrial service life of articles which may contain residual registration substance in cement retardation products.

9.12.1 Env CS 1: Service life - workers; Industrial (ERC 12b), ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.12.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.12.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.2.2. Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.12.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.12.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.12.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.12.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.12.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.12.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13 Exposure scenario 14: Service life (professional worker) - Service life of articles; cement retardation product; professional use

Market sector: Use in cement retardation products
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES11: Widespread use by professional workers - Professional use in cement retardation products

Further description of the use:

This scenario covers the professional service life of articles which may contain residual registration substance in cement retardation products.

9.13.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.13.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.13.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.13.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.13.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.13.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.13.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.13.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.13.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14 Exposure scenario 15: Service life (consumers) - Service life of articles; cement retardation product; consumer use

Market sector: Use in cement retardation products

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Cement retardation products; Indoor	AC 0
CS 3	Cement retardation products; Outdoor	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES12: Consumer use - Consumer use in Cement retardation products

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in cement retardation products.

9.14.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.14.2 Cons CS 2: Cement retardation products; Indoor (AC 0)

9.14.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.14.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.14.3 Cons CS 3: Cement retardation products; Outdoor (AC 0)

9.14.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *The concentration of citrate in these products is generally low (<1%).*	

9.14.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.15 Exposure scenario 16: Use at industrial sites - Use in polymers and plastics

Market sector: Use in polymers and plastics
Product category used: PC 32: Polymer Preparations and Compounds
Sector of use: SU 11: Manufacture of rubber products; SU 12: Manufacture of plastics products, including compounding and conversion

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citric acid and citrate salts may be used as a component of blowing agents in the manufacture of foamed thermoplastics. This application, described below, should be taken as representative of where and why citric acid or citrate salts may be used within the plastics and polymers industry; other applications are possible.
Polyolefin foams are used for a variety of applications such as automotive, construction, food packaging, sport and leisure, and many other industrial and consumer uses. They usually have a high strength to weight ratio and are manufactured in a variety of processes and in low density (25 - 250 kg/m^3) or high density (250 - 700 kg/m^3) versions, or even in densities as low as 16 kg/m^3 for polystyrene. All current extrusion processes involve the following steps: melting, mixing with blowing agents, cooling of melt, expansion and degassing/aging. The steps in this process can be realized in different configurations of equipment, *e.g.*, with long single-screw extruders, twin-screw extruders, or tandem extruder lines.
The choice of chemical or physical blowing agents depends on the foam density to be reached (*e.g.* the foam application) and influences the necessary foaming equipment and the costs of the foamed materials. High-density thermoplastic foams based on, *e.g.*, polypropylene or polystyrene, may be produced using blowing agents which decompose to generate gas which is soluble in the melt but which is released as the pressure is reduced (*e.g.*, by passing through a dye) to produce a foam. The foaming process is complex but involves bubble nucleation followed by bubble growth.
One example of a commercially used chemical foaming agent is based on citric acid (or monosodium citrate) in combination with sodium carbonate or (sodium bicarbonate) in a weight ratio of between about 1:1 and about 5:1 respectively [US 5 302 455]. The citric acid/sodium bicarbonate system decomposes at 160 – 210°C to release 120 cm^3/g of CO_2. [Karger-Kocsis, 1999; Brydson, 1999; Holmberg, 2002]
Both citric acid (or citrate salt) and (bi)carbonate may be surface-treated with, for example, a fatty acid ester to make them compatible with the polyolefin. A concentrated master batch of the formulated foaming agent in polymer at loading levels of from about 5% to about 50% actives may then be prepared. The master batch is added to the polymer melt which is to be foamed such that the blowing agents are at 0.1 to 2.0% active levels in the final formulation [US 5 302 455 and refs. therein]. The pre-treatment formulation and foaming processes are typically closed or open batch

processes. The citrate is typically present as a solid prior to mixing with the polymer melt.
By-products of this reaction are mono-, di-, and/or trisodium citrate, in combination with other sodium salts, which will still be present within the foamed polymer. These residues are typically present at around 50 wt.% of the initial foaming agent formulation which is equivalent to <1 wt.% of the total foamed polymer in most cases [RAPRA, 2004]. No citric acid is present in the final polymer.

9.15.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.15.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.15.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)

9.15.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.15.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.15.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.15.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 % *transfer of solid*	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.15.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.15.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16 Exposure scenario 17: Use at industrial sites - Use in scale inhibition in oilfield water systems

Market sector: Use in scale inhibition in oilfield water systems
Product category used: PC 35: Washing and Cleaning Products; PC 37: Water treatment chemicals
Sector of use: SU 2a: Mining (without offshore industries); SU 2b: Offshore industries

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 4	Mixing or blending in batch processes; Liquid	PROC 5
CS 5	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 6	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines.
This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place. Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.16.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.16.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.16.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.3 Worker CS 3: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.16.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.4 Worker CS 4: Mixing or blending in batch processes; Liquid (PROC 5)

9.16.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.16.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.16.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.16.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.16.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17 Exposure scenario 18: Use at industrial sites - Use in the textiles industry

Market sector: Use in the textiles industry
Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 23: Leather treatment products; PC 34: Textile dyes and impregnating products
Sector of use: SU 5: Manufacture of textiles, leather, fur

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

The OECD Emission Scenario Document on the Textile Finishing Industry [OECD, 2004A] describes the textile industry as “one of the largest and most complicated industrial chains in manufacturing industry”. The industry is dominated by small and medium-sized companies, working in three main sectors: clothing, home furnishings and industrial. Activity in the textile finishing industry is distributed across the EU, but (within the EU-15) the dominant Member State is Italy, accounting for around 36% of production, followed by German (approx. 13%), France (approx. 12%), the UK and Spain (approx. 10% each). The overall market for textiles, including yarn production and carpets, is also dominated by Italy, with around a 30% market share (EC, 2002). Similarly, for leather, the most important producer and transformer in Europe is Italy (84% of all companies), followed by Spain [OECD, 2004B].Within the textile and leather finishing industries, citric acid and related salts may be used in a wide variety of applications. However, these uses may be summarized (albeit with some overlap) as being based on either acidity (and pH regulation) or the ability to complex metal ions. Examples of applications where these are important are:• Acidification of flame-retardant treating baths• Curing catalyst for treatments such as easy-care resins • Sequestering of alkaline earth or transition metal ions to prevent interference in dyeing and other processes. Potential exposure to humans and especially the environment is dependent on the intended function of the substance, as well as the substrates and processes used. Functional finishing agents and other chemically reactive substances are intended to be consumed during use; therefore the amount released is related to the efficiency of the process. On the other hand, non-reacting substances (e.g. processing aids) are not consumed and will ultimately be lost to air or waste water, depending on their function and physicochemical properties. In virtually all cases, it is expected that citric acid or citrate salts, as process aids, will be lost to waste water. The following applications should be taken as representative rather than exhaustive examples of where and why citric acid or citrates may be used within the textile and leather finishing industries. Further details of these examples may be found in European Commission Reference Document on Best Available Techniques for the Textiles Industry [BREF, 2003].Flame Retardants: Potassium salts of fluoro complexes of zirconium (potassium hexafluorozirconate) are typically used as flame retardants for wool and wool-blend fibres. Typical

application conditions for carpet wool yarn are as follows:• Rinse to remove unwanted salts / anions.• Bath set up at 20 – 30ºC and pH 3: citric acid (4 % on weight of fabric) may be used.• Addition of potassium hexafluorozirconate dissolved in hot water.• Temperature raised at 1 – 2 K per minute to 60ºC and held at this temperature for 30 minutes• Rinse in cold water for 10 - 20 minutes. Durable Press Resins: Cellulosic fabrics such as cotton or its blends are often treated with a finish which prevents wrinkling and shrinkage during laundering and drying. These finishes are known by a variety of names: easy-care, wash-and-wear finishing, no-iron, wrinkle resistant etc. Recipes for resin-finishing liquors are in general aqueous solutions or dispersions which consist of a cross-linking resin, a catalyst, a wetting agent/emulsifier (mainly a non-ionic surfactant) plus a number of additives. Cross-linking resin systems are often based on urea-formaldehyde or melamine-formaldehyde. The most commonly used catalyst is magnesium chloride. In many cases liquid mixtures are used, which are based on magnesium chloride plus an organic acid such as citric acid. Catalyst is used at 10 – 30 % of the weight of the cross-linking resin, which is itself used in the range of 5% (for blends) up to 12% (for 100% cotton) on the weight of the fabric. A typical bath may contain: cross-linking resin, 50 g/l; catalyst (MgCl2), 7 g/l; and acid, 0.5 g/l.Pre-treatment and Dyeing: The presence of ions of alkaline earth metals (calcium and magnesium) and/or other metals (especially iron) may have negative effects on various wet processes not only in pre-treatment (e.g. catalytic destruction of hydrogen peroxide) but also in dyeing. Purified and softened water is used in textile finishing mills but often this is not enough and specific auxiliary formulations containing metal complexing agents need to be added to the baths. Typical sequestering agents which have been used are polyphosphates, phosphonates, and amino carboxylic acids (e.g., EDTA). The main concerns associated with the use of these substances arise from their N- and P-content, their often-low biodegradability/bio-eliminability, and their ability to form stable complexes with metals (the very reason they are used in the first place!), which may lead to remobilisation of heavy metals in effluent or downstream sediments. Hydroxy-carboxylic acids (e.g., gluconates, citrates) are convenient alternatives to the above named conventional sequestering agents. None of these substances contains N or P in their molecular structure. In addition, hydroxy-carboxylic acids are readily biodegradable. A typical hydrogen peroxide-based bleaching formulation for cotton (or its blends) will use 0 – 20 g sequestering agent per kg of textile being treated. For bleaching of wool, 5 – 30 g/kg may be used. For dyeing of cellulosic fabrics, 1 – 3 g/litre of sequestering agent may be used.

9.17.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.17.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.17.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.17.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.17.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.17.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.44 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)

9.17.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.17.6 Worker CS 6: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.17.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.17.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.18 Exposure scenario 19: Use at industrial sites - Industrial use of coatings and paints

Market sector: Use in coatings and paints
Product category used: PC 9a: Coatings and Paints, Thinners, paint removers

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 5	Roller application or brushing; Liquid	PROC 10
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Subsequent service life exposure scenario(s):
ES22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Further description of the use:

The term “coatings” as used in this document describes any material that can be applied to a surface as a thin continuous, layer (film). This includes paints, lacquers or varnishes. Such coatings are used in a wide range of application to protect surfaces from corrosion and other environmental effects, provide decorative effects and improve inherent performance properties. Film formation can be a physical process, where solvents evaporate from solutions or melted substances solidify, or a chemical process involving reactions between reactive groups in binders [OECD, 2007].
The application of a coating to a surface can be by manual use of brush/roller, spraying systems, and dip or roll coating systems [OECD, 2007]. The type and constituent composition of the coating product are based on the substrate, intended use, service environment and the desired role of coating. Decorative coatings cover the use of paints applied to buildings, their trim and fittings and for decorative and protective purposes by both professionals and the general public. All decorative coatings are supplied as liquid materials [OECD, 2007].
Titanium dioxide (TiO2) is the most important inorganic pigment in terms of quantity. The world production in 2000 amounted to nearly 4 million tonnes per year. Titanium dioxide white inorganic pigments are used primarily in the production of paints, printing inks, paper and plastic products. Titanium dioxide is of outstanding importance as a white pigment because of its scattering properties, its chemical stability, and lack of toxicity [BREF, 2007]. Citrates may be used to retard the settling of titanium dioxide in aqueous dispersions.
The following application should be taken as representative rather than the sole example of where and why citric acid or citrates may be used within the coatings industry.
Anti-settling of Pigment: In the paint industry citric acid and citrate salts are used to retard the settling of titanium dioxide, the most common pigment used in paints and other coatings [APAC, 2009]. Shipping of titanium dioxide as an aqueous slurry has advantages in handling and storage space versus shipping as a fine solid. Although titanium dioxide particles will initially disperse in water, they separate rapidly and in a short time will form a hard-packed sediment which is virtually

impossible to re-disperse. The presence of ions such as calcium or iron causes flocculation, which exacerbates the problem. In the early 1970s, it was discovered that addition of 0.04 – 0.4% citric acid or tartaric acid or their simple salts (sodium, potassium, ammonium) substantially retarded the settling and packing of titanium dioxide particles in aqueous dispersions [US 3 663 284].
At least a portion of the citric acid added to aid shipment of the pigment is likely to still be present during formulation of the paint. Indeed, it is possible that further additions are made to allow re-dispersion of pigment in the final paint formulation.

9.18.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.18.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.18.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.18.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation

(EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.18.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.5 Worker CS 5: Roller application or brushing; Liquid (PROC 10)

9.18.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.18.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.18.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.18.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.18.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.18.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19 Exposure scenario 20: Widespread use by professional workers - Professional use in paints and coatings

Market sector: Use in coatings and paints
Product category used: PC 9a: Coatings and Paints, Thinners, paint removers
Sector of use: SU 18: Manufacture of furniture; SU 19: Building and construction work

Environment contributing scenario(s):		
CS 1	Widespread use leading to inclusion into/onto article (indoor)	ERC 8c
CS 2	Widespread use leading to inclusion into/onto article (outdoor)	ERC 8f
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Manual activities involving hand contact; Liquid	PROC 19
CS 6	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Subsequent service life exposure scenario(s):
ES23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Further description of the use:

This scenario covers professional use in paints and coatings.

9.19.1 Env CS 1: Widespread use leading to inclusion into/onto article (indoor) (ERC 8c)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.2 Env CS 2: Widespread use leading to inclusion into/onto article (outdoor) (ERC 8f)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.19.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)

9.19.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)

9.19.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.5 Worker CS 5: Manual activities involving hand contact; Liquid (PROC 19)

9.19.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *If the concentration of citric acid is less than 20%, then respiratory protection is not required. However, if the substance is formulated with other classified ingredients, then the supplier will have to take this into consideration when devising safe use conditions.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.19.6 Worker CS 6: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.19.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification.Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification.Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.19.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.19.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20 Exposure scenario 21: Consumer use - Consumer use in paints and coatings

Market sector: Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
CS 2	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
Consumer contributing scenario(s):		
CS 3	Coatings and paints, thinners, paint removers; Liquid	PC 9a
CS 4	Coatings and paints, thinners, paint removers; Solid, medium dustiness	PC 9a

Subsequent service life exposure scenario(s):
ES24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Further description of the use:

This scenario covers consumer use in paints and coatings.

9.20.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.2 Env CS 2: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.20.3 Cons CS 3: Coatings and paints, thinners, paint removers; Liquid (PC 9a)

9.20.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.20.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of

ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.20.4 Cons CS 4: Coatings and paints, thinners, paint removers; Solid, medium dustiness (PC 9a)

9.20.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.20.4.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid in consumer products is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21 Exposure scenario 22: Service life (worker at industrial site) - Service life of articles; coatings and paints; industrial use

Market sector: Use in coatings and paints
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES19: Use at industrial sites - Industrial use of coatings and paints

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance in coatings or paints.

9.21.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.21.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.21.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.21.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.21.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.21.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.21.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.21.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.21.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22 Exposure scenario 23: Service life (professional worker) - Service life of articles; coatings and paints; professional use

Market sector: Use in coatings and paints
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Professional	ERC 10a, ERC 11a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES20: Widespread use by professional workers - Professional use in paints and coatings

Further description of the use:

This scenario covers the professional service life of articles that may contain residual registration substance in coatings or paints.

9.22.1 Env CS 1: Service life - workers; Professional ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.22.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.22.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.22.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.22.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	1.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.22.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.22.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.22.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.22.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.84 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.23 Exposure scenario 24: Service life (consumers) - Service life of articles; coatings and paints; consumer use

Market sector: Use in coatings and paints

Environment contributing scenario(s):		
CS 1	Service life - consumers	ERC 10a, ERC 11a
Consumer contributing scenario(s):		
CS 2	Paints and coatings	AC 0

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES21: Consumer use - Consumer use in paints and coatings

Further description of the use:

This scenario covers the consumer service life of articles which may contain residual registration substance in coatings or paints.

9.23.1 Env CS 1: Service life - consumers ERC 10a, ERC 11a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.23.2 Cons CS 2: Paints and coatings (AC 0)

9.23.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 %	

9.23.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.24 Exposure scenario 25: Use at industrial sites - Industrial use in photographic processing

Market sector: Use in photographic processing
Product category used: PC 30: Photo-chemicals

Environment contributing scenario(s):		
CS 1	Use of reactive processing aid at industrial site (no inclusion into or onto article)	ERC 6b
Worker contributing scenario(s):		
CS 2	Mixing or blending in batch processes; Liquid	PROC 5
CS 3	Treatment of articles by dipping and pouring; Liquid	PROC 13
CS 4	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 5	Treatment of articles by dipping and pouring; Solid, medium dustiness	PROC 13

Further description of the use:

Citric acid is one of a range of complexing agents used in photography to control the effects of calcium and magnesium hardness, and to keep iron soluble in solution as part of redox processes.
Due to the rapid growth of digital photography, use of chemicals in film processing is now limited almost entirely to a small number of professional providers. The chemicals used are collected by photochemical companies in order to recover silver and disposal to drain does not take place.
Citrate may also be used as a stop bath in professional or consumer settings as part of the process for the manual development of photographic film.
The film is removed from the camera and wound onto a reel in darkroom or a lightproof bag. The reel is placed in a light-proof tank and a succession of aqueous solutions is added. Sheet film may be processed by placing the film in a succession of trays containing the appropriate solutions.
The film is pre-soaked in water and then soaked in the developer to convert the latent image to a visible image. The developer is normally alkaline, so a mild acid such as citric acid will neutralize it; this is called a stop bath. The image is then fixed and the film is washed and dried.
The citric acid stop batch may be purchased pre-formulated or mixed from citric acid powder and other ingredients.

9.24.1 Env CS 1: Use of reactive processing aid at industrial site (no inclusion into or onto article) (ERC 6b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.24.2 Worker CS 2: Mixing or blending in batch processes; Liquid (PROC 5)

9.24.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.

When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.3 Worker CS 3: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.24.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.4 Worker CS 4: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.24.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.24.5 Worker CS 5: Treatment of articles by dipping and pouring; Solid, medium dustiness (PROC 13)

9.24.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.24.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.24.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.25 Exposure scenario 26: Consumer use - Consumer use in photographic processing

Market sector: Use in photographic processing

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8a
Consumer contributing scenario(s):		
CS 2	Photo-chemicals	PC 30

Further description of the use:

This scenario covers consumer use in photographic processing.

9.25.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8a)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.25.2 Cons CS 2: Photo-chemicals (PC 30)

9.25.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.25.2.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.26 Exposure scenario 21: Use at industrial sites - Industrial use as an anti-scalant, complexing agent in water treatment systems

Market sector: Use as an anti-scalant, complexing agent in water treatment systems
Product category used: PC 20: Products such as ph-regulators, flocculants, precipitants, neutralization agents; PC 36: Water softeners; PC 37: Water treatment chemicals

Environment contributing scenario(s):		
CS 1	Industrial use as an anti-scalant, complexing agent in water treatment systems	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 6	Industrial spraying; Liquid	PROC 7
CS 7	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 8	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 9	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9

Further description of the use:

Citric acid may be used as a complexing agent to decrease scale formation and inhibit corrosion of metal equipment and pipelines.This includes, for example, cleaning of (steam) boilers or reheaters, removal of calcium and rust layers from steam blocks and hot water systems, removal of rust in cleaning bilges and desalination units aboard ships, removal of mill scale from welding operations in nuclear reactors. It may also be used as an additive in circulating cooling water systems. These systems typically use high substance concentration at low discharges and would usually have a waste water treatment plant (WWTP) in place.Citric acid would generally be formulated in an additive package prior to use, and typically supplied in aqueous solution form with active ingredient content of 25 – 65%.

9.26.1 Env CS 1: Industrial use as an anti-scalant, complexing agent in water treatment systems (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.26.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 1)

9.26.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.26.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.5 Worker CS 5: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.26.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.6 Worker CS 6: Industrial spraying; Liquid (PROC 7)

9.26.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.26.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.26.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *Transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.26.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.26.9 Worker CS 9: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.26.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.26.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27 Exposure scenario 28: Use at industrial sites - Industrial use of treatment of metal surfaces

Market sector: Treatment of metal surfaces
Product category used: PC 7: Base metals and alloys; PC 14: Metal surface treatment products

Environment contributing scenario(s):		
CS 1	Use at industrial site leading to inclusion into/onto article	ERC 5
Worker contributing scenario(s):		
CS 2	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid	PROC 2
CS 3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 4	Chemical production where opportunity for exposure arises; Liquid	PROC 4
CS 5	Industrial spraying; Liquid	PROC 7
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 8	Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid	PROC 9
CS 9	Roller application or brushing; Liquid	PROC 10
CS 10	Treatment of articles by dipping and pouring; Liquid	PROC 13

Subsequent service life exposure scenario(s):
ES29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Further description of the use:

Citric acid may be used as a complexing agent during metal surface treatment operations. The following applications should be taken as representative rather than the sole example of where and why citric acid or citrates may be used in the treatment of metal surfaces. Some industries using citric acid include fasteners, medical devices, semi-conductors, automotive and aerospace.
Passivation: Citric acid may be used in stainless steel passivation to assist oxidation of the surface of the stainless steel and prevent later corrosion. After thorough cleaning, the stainless steel part is immersed in a passivating acid bath. Any one of three approaches can be used: nitric acid passivation, nitric acid with sodium dichromate passivation and citric acid passivation. Which approach to use depends on the grade of stainless steel and prescribed acceptance criteria. When citric acid passivation is used, typical solutions range from 4 to 10% citric acid by weight.
Electroless plating: Plating describes the coating of surfaces with metals, either through an electrolysis or electroless plating processes. Electroless plating is also known as ‘autocatalytic’ plating; deposition of the metal starts on metal nuclei such as palladium and continues autocatalytically. Electroless plating is favoured over electrolysis for most component production (EA 2009).

There are usually three stages in the electroless plating process: de-smearing, activation and electroless copper plating. The plating solution has a copper content of 2 – 5 g/l, with sodium hydroxide (15 – 20 g/l), complexing agents (10 – 15 g/l) or tartrates (5 – 10 g/l) and reducing agents, such as formaldehyde (3 – 5 g/l). The process solution lifetime is limited by the build-up of reaction products and is proportional to the rate of throughput of components (EA 2009). Citrate may be used as a complexing agent.
Electroless plating involves the large-scale use of water in both providing the medium for the process itself and for the subsequent rinsing and washing of components. There is a degree of recycling of rinse water through use to top-up the plating tanks, but there is ultimately loss through carry-over on components. Spent fluids can only be topped up a limited number of times before the media needs replacing. Water-soluble waste is discharged in waste water for basic on-site treatment (settling and pH adjustment) before discharge to municipal treatment works, controlled by local discharge consent agreements (EA 2009).

9.27.1 Env CS 1: Use at industrial site leading to inclusion into/onto article (ERC 5)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.27.2 Worker CS 2: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Liquid (PROC 2)

9.27.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no

unacceptable risk to human health from storage or handling of citric acid.

9.27.3 Worker CS 3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.27.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.4 Worker CS 4: Chemical production where opportunity for exposure arises; Liquid (PROC 4)

9.27.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):

Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.5 Worker CS 5: Industrial spraying; Liquid (PROC 7)

9.27.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.27.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.7 Worker CS 7: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.27.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.27.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.8 Worker CS 8: Transfer of substance or mixture into small containers (dedicated filling line, including weighing); Liquid (PROC 9)

9.27.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.8.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.9 Worker CS 9: Roller application or brushing; Liquid (PROC 10)

9.27.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.9.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore

qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.27.10 Worker CS 10: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.27.10.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.27.10.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.28 Exposure scenario 29: Service life (worker at industrial site) - Service life of articles; treatment of metal surfaces; industrial use

Market sector: Treatment of metal surfaces
Article categories:
AC 0: Other

Environment contributing scenario(s):		
CS 1	Service life - workers; Industrial	ERC 12b, ERC 12a
Worker contributing scenario(s):		
CS 2	Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use	PROC 21
CS 3	Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use	PROC 21
CS 4	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use	PROC 24
CS 5	High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use	PROC 24

Exposure scenario(s) of the uses leading to the inclusion of the substance into the article(s):
ES28: Use at industrial sites - Industrial use of treatment of metal surfaces

Further description of the use:

This scenario covers the industrial service life of articles that may contain residual registration substance on treated metal surfaces.

9.28.1 Env CS 1: Service life - workers; Industrial ERC 12b, ERC 12a

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.28.2 Worker CS 2: Low energy manipulation and handling of substances bound in/on materials and/or articles; Indoor use (PROC 21)

9.28.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.3 Worker CS 3: Low energy manipulation and handling of substances bound in/on materials and/or articles; Outdoor use (PROC 21)

9.28.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.4 Worker CS 4: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Indoor use (PROC 24)

9.28.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.28.5 Worker CS 5: High (mechanical) energy work-up of substances bound in/on materials and/or articles; Outdoor use (PROC 24)

9.28.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 1 % *Assumed as a reasonable worst-case for residual citric acid on the metal surface.*	TRA Workers 3.0
• Physical form of the used product: Solid (non or low dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%] *Product concentration below threshold for hazard classification. Therefore, respiratory protection is not required, see "risk characterisation" section below.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: No *Product concentration below threshold for hazard classification. Therefore, eye protection is not required, see "risk characterisation" section below.*	
Other conditions affecting workers exposure	
• Place of use: Outdoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.28.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.28.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.28 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. Ocular exposure to the substance is not considered applicable during normal handling and use of articles.
No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.29 Exposure scenario 30: Use at industrial sites - Cleaning of metal surfaces

Market sector: Cleaning of metal surfaces
Product category used: PC 35: Washing and Cleaning Products

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Industrial spraying; Liquid	PROC 7
CS 3	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 4	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b
CS 5	Transfer of substance or mixture into small containers (dedicated filling line, including weighing)	PROC 9
CS 6	Roller application or brushing; Liquid	PROC 10
CS 7	Treatment of articles by dipping and pouring; Liquid	PROC 13

Further description of the use:

Citric acid may be used as cleaning of circuit boards prior to soldering, and metal cleaning or chemical polishing for the surface treatment of aluminium, copper and other metals.

9.29.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.29.2 Worker CS 2: Industrial spraying; Liquid (PROC 7)

9.29.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.2.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	40 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.3 Worker CS 3: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.29.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.29.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form) *transfer of solid*	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.29.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.5 Worker CS 5: Transfer of substance or mixture into small containers (dedicated filling line, including weighing) (PROC 9)

9.29.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.6 Worker CS 6: Roller application or brushing; Liquid (PROC 10)

9.29.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.6.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.29.7 Worker CS 7: Treatment of articles by dipping and pouring; Liquid (PROC 13)

9.29.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.29.7.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30 Exposure scenario 31: Use at industrial sites - Use in agricultural applications

Market sector: Use in agricultural applications
Product category used: PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
Worker contributing scenario(s):		
CS 2	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid	PROC 3
CS 3	Mixing or blending in batch processes; Liquid	PROC 5
CS 4	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid	PROC 8a
CS 5	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid	PROC 8b
CS 6	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness	PROC 3
CS 7	Mixing or blending in batch processes; Solid, medium dustiness	PROC 5
CS 8	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 9	Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness	PROC 8b

Further description of the use:

Citrate complexes of iron, copper, magnesium, manganese and zinc are used to correct soil deficiencies of these minerals because they are soluble in water at normal soil pH. The soluble citrate complex promotes the transfer of the metal nutrient into the plant's root or leaf system. The biodegradability of citric acid is important for this application (APAC 2009).
One common method for making fertilisers involves dissolving metal sulfates in water and citric acid followed by neutralization with ammonia. This process may be carried out in an industrial setting as part of the formulation of solid or liquid fertilisers/plant feeds. In this case, citric acid is an intermediate and it is the metal-citrate or ammonium citrate that must be considered for the professional or consumer use of fertilisers/plant feeds. Magnesium citrate may be used in this context. Alternatively, mixing of fertilisers may take place on farms. In this case, exposure may be to solid or liquid citric acid or metal-citrate (including sodium citrate).
Citrates may also be present as dispersant/scale inhibiting agents, i.e. adjuvants in the preparation. Evidence from other applications in which citrate is acting as a scale control agent/dispersant suggests that citrate may be present at very low levels in the formulation, perhaps *approx.* 1-20 ppm.
In any of the above cases, marketed products may be solid (granules or pellets) or solution. Processes used may include transfer, loading, mixing, rolling/brushing and spraying.
Plant feeds containing citrates may also be used in professional or consumer settings. The products may be liquids or granules and may be sprayed or poured.
Citrates may also be used in plant protection products and in animal feed; however, these applications fall outside the scope of REACH.

9.30.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.30.2 Worker CS 2: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Liquid (PROC 3)

9.30.2.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.2.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.3 Worker CS 3: Mixing or blending in batch processes; Liquid (PROC 5)

9.30.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.4 Worker CS 4: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Liquid (PROC 8a)

9.30.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.4.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion,

according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.5 Worker CS 5: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Liquid (PROC 8b)

9.30.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.6 Worker CS 6: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition; Solid, medium dustiness (PROC 3)

9.30.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed batch process with occasional controlled exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.7 Worker CS 7: Mixing or blending in batch processes; Solid, medium dustiness (PROC 5)

9.30.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.8 Worker CS 8: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.30.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.30.9 Worker CS 9: Transfer of substance or mixture (charging/discharging) at dedicated facilities; Solid, medium dustiness (PROC 8b)

9.30.9.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.30.9.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.30.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.4 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31 Exposure scenario 32: Widespread use by professional workers - Professional use in agricultural applications

Market sector: Use in agricultural applications
Product category used: PC 12: Fertilizers

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Worker contributing scenario(s):		
CS 3	Roller application or brushing; Liquid	PROC 10
CS 4	Non-industrial spraying; Liquid	PROC 11
CS 5	Use as laboratory reagent; Liquid	PROC 15
CS 6	Tabletting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness	PROC 14
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15
CS 8	Manual activities involving hand contact; Solid, medium dustiness	PROC 19

Further description of the use:

This scenario covers professional use in agricultural applications in liquid products.

9.31.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, indoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.31.3 Worker CS 3: Roller application or brushing; Liquid (PROC 10)

9.31.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.3.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.4 Worker CS 4: Non-industrial spraying; Liquid (PROC 11)

9.31.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure and as best practice to protect against aerosol exposure*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	80 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.5 Worker CS 5: Use as laboratory reagent; Liquid (PROC 15)

9.31.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Liquid	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.5.2 Exposure and risks for workers

No exposure datasets are defined for this worker contributing scenario.

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.6 Worker CS 6: Tabletting, compression, extrusion, pelettisation, granulation; Solid, medium dustiness (PROC 14)

9.31.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)

9.31.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.31.8 Worker CS 8: Manual activities involving hand contact; Solid, medium dustiness (PROC 19)

9.31.8.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.31.8.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.31.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.32 Exposure scenario 33: Consumer use - Consumer use in agricultural applications

Market sector: Use in agricultural applications

Environment contributing scenario(s):		
CS 1	Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor)	ERC 8 d
CS 2	Widespread use of reactive processing aid (no inclusion into or onto article, indoor)	ERC 8b
Consumer contributing scenario(s):		
CS 3	Fertilizers	PC 12

Further description of the use:

This scenario covers consumer use in agricultural applications.

9.32.1 Env CS 1: Widespread use of non-reactive processing aid (no inclusion into or onto article, outdoor) (ERC 8 d)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.2 Env CS 2: Widespread use of reactive processing aid (no inclusion into or onto article, indoor) (ERC 8b)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.32.3 Cons CS 3: Fertilizers (PC 12)

9.32.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 5 %	

9.32.3.2 Exposure and risks for consumers

No exposure datasets are defined for this consumer contributing scenario.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
The concentration of citric acid is below the thresholds for classification of ingredients in mixtures for substances classified as Eye Irrit. Cat 2 and STOT SE 3 (respiratory tract) according to Regulation (EC) No 1272/2008. No specific risk management measures are required and there is no unacceptable risk to humans from eye or inhalation exposure to citric acid.

9.33 Exposure scenario 34: Use at industrial sites - Laboratory reagent

Market sector: Laboratory reagent
Product category used: PC 21: Laboratory Chemicals

Environment contributing scenario(s):		
CS 1	Use of non-reactive processing aid at industrial site (no inclusion into or onto article)	ERC 4
CS 2	Use of functional fluid at industrial site	ERC 7
Worker contributing scenario(s):		
CS 3	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 1
CS 4	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness	PROC 2
CS 5	Chemical production where opportunity for exposure arises; Solid, medium dustiness	PROC 4
CS 6	Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness	PROC 8a
CS 7	Use as laboratory reagent; Solid, medium dustiness	PROC 15

Further description of the use:

Citric acid may be used at low levels within laboratories.

9.33.1 Env CS 1: Use of non-reactive processing aid at industrial site (no inclusion into or onto article) (ERC 4)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.2 Env CS 2: Use of functional fluid at industrial site (ERC 7)

Exposure assessment and risk characterisation are not required (see scope under 9.0.3).

9.33.3 Worker CS 3: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 1)

9.33.3.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 8 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• Closed process without likelihood of exposure	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.3.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.1 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.04 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.4 Worker CS 4: Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions; Solid, medium dustiness (PROC 2)

9.33.4.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.4.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.2 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.5 Worker CS 5: Chemical production where opportunity for exposure arises; Solid, medium dustiness (PROC 4)

9.33.5.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.5.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.3 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.6 Worker CS 6: Transfer of substance or mixture (charging/discharging) at non dedicated-facilities; Solid, medium dustiness (PROC 8a)

9.33.6.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required to control exposure to dust from inhalation in order to reduce exposure below the work place exposure limit (WEL) of 10 mg/m^3 and as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.6.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.4 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.

9.33.7 Worker CS 7: Use as laboratory reagent; Solid, medium dustiness (PROC 15)

9.33.7.1 Conditions of use

	Method
Product (article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Physical form of the used product: Solid (medium dusty form)	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: <= 4 h/day	TRA Workers 3.0
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour) [Effectiveness Inhalation: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• Local exhaust ventilation: No [Effectiveness Inhalation: 0%, Dermal: 0%]	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: Yes (Respirator with APF of 10) [Effectiveness Inhalation: 90%] *Required as a qualitative risk management measure for short term inhalation exposure.*	TRA Workers 3.0
• Dermal protection: No [Effectiveness Dermal: 0%]	TRA Workers 3.0
• Use of eye protection: Yes *Required as a qualitative risk management measure for local eye exposure.*	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Operating temperature: <= 40°C	TRA Workers 3.0

9.33.7.2 Exposure and risks for workers

The exposure concentrations and risk characterisation ratios (RCR) are reported in the following table.

Table 9.33.5 Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, local, acute	0.2 mg/m³ (TRA Workers)	Qualitative risk

Remarks on exposure dataset obtained with ECETOC TRA

The vapour pressure at operating temperature (40°C) used for the calculation is 5.78E-6 Pa.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, acute, Eye, local):
Citric acid is classified as irritating to eyes (Eye Irrit. Cat. 2) and the respiratory tract (STOT SE 3 (respiratory irritation)). No quantitative dose descriptors are available for these endpoints therefore qualitative hazard conclusions and risk characterisation are applied. The overall hazard conclusion, according to ECHA Technical Guidance Part E, Table E.3-1 is “low hazard”.
When the appropriate measures are applied (such as those described in Section 9.0.4.2.) there is no unacceptable risk to human health from storage or handling of citric acid.