

9.0.1. Overview of uses and Exposure Scenarios

Tonnage information:

Assessed tonnage: 2000.0 tonnes/year based on:

- 2000.0 tonnes/year manufactured in Europe

The following table list all the exposure scenarios (ES) assessed in this CSR.

Table 1. Overview of exposure scenarios and contributing scenarios

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
ES1 - M1		Manufacture on production site - Use in closed batch process (synthesis or formulation) (PROC 3) - Transfer of substance or preparation (charging/discharging) from/to ves-sels/large containers at dedicated facili-ties (PROC 8b)	938.0
ES2 - F1		Distribution - Distribution (ERC 2) - Bulk transfert - dedicated activities (PROC 8b) - Small package filling (PROC 9)	2000.0 (Europea n figures)
ES3 - F2		Formulation - Formulation (ERC 2) - General exposure (closed system) (PROC 1) - General exposure (closed system) with sample collection (PROC 2) - General exposure (closed system) - batch- with sample collection (PROC 3) - General exposure (open system)- batch- with sample collection (PROC 4) - Mixing (PROC 5) - Bulk transfert non dedicated activities (PROC 8a) - Bulk transfert dedicated facilities (PROC 8b) - Small package filling (PROC 9) - Production of preparation or articles (PROC 14) - Laboratory activities (PROC 15)	2000.0 (Europea n figures)
ES4 - IW1		Use as processing aid (water treatment) - Use as processing aid (ERC 6b) - General exposure (closed system) (PROC 1) - General exposure (closed system) with sample collection (PROC 2) - General exposure (closed system) - batch- with sample collection (PROC 3) - General exposure (open system)- batch- with sample collection (PROC 4) - Calendering (PROC 6) - Spraying (PROC 7) - Bulk transfert non dedicated activities (PROC 8a) - Bulk transfert dedicated facilities (PROC 8b) - Small package filling (PROC 9) - Treatment of articles (PROC 13) - Production of preparation or articles (PROC 14) - Laboratory activities (PROC 15)	920.0 (Europea n figures)
ES5 - IW2		Polymer processing - Polymer processing (ERC 6d)	920.0 (Europea n figures)

Identifiers	Market Sector	Titles of exposure scenarios and the related contributing scenarios	Tonnage (tonnes per year)
		<ul style="list-style-type: none"> - General exposure (closed system) (PROC 1) - General exposure (closed system) with sample collection (PROC 2) - General exposure (closed system) - batch- with sample collection (PROC 3) - General exposure (open system)- batch- with sample collection (PROC 4) - Mixing (PROC 5) - Calendering (PROC 6) - Spraying (PROC 7) - Bulk transfert non dedicated activities (PROC 8a) - Bulk transfert dedicated facilities (PROC 8b) - Small package filling (PROC 9) - Treatment of articles (PROC 13) - Laboratory activities (PROC 15) - Production of preparation or articles (PROC 14) 	n figures)
ES6 - PW1		<ul style="list-style-type: none"> Colour stabilizer (film/photographic industry) - Colour stabilizer (film/photographic industry) (ERC 8b) - Bulk transfert non dedicated facilities (PROC 8a) - Bulk transfert dedicated facilities (PROC 8b) - Small package filling (PROC 9) - Roller application or brushing (PROC 10) - Spraying (non industrial) (PROC 11) - Laboratory activities (PROC 15) 	80.0(Euro pean figures)
ES7 - IW3		<ul style="list-style-type: none"> Colour stabilizer for chemical products (fuel, resins, etc.) and for de-colourisation of phenols - Colour stabilizer for chemical products (fuel, resins, etc.) and for de-colourisation of phenols (ERC 6d) - General exposure (closed system) (PROC 1) - General exposure (closed system) with sample collection (PROC 2) - General exposure (closed system) - batch- with sample collection (PROC 3) - General exposure (open system)- batch- with sample collection (PROC 4) - Calendering (PROC 6) - Spraying (PROC 7) - Bulk transfert non dedicated activities (PROC 8a) - Bulk transfert dedicated facilities (PROC 8b) - Small package filling (PROC 9) - Treatment of articles (PROC 13) - Production of preparation or articles (PROC 14) - Laboratory activities (PROC 15) 	80.0(Euro pean figures)
Manufacture: M-#, Formulation: F-#, Industrial end use at site: IW-#, Professional end use: PW-#, Consumer end use: C-#, Service life (by workers in industrial site): SL-IW-#, Service life (by professional workers): SL-PW-#, Service life (by consumers): SL-C-#.)			

9.0.2. Introduction to the assessment

9.0.2.1. Environment

Scope and type of assessment

The scope of exposure assessment and type of risk characterisation required for the environment are described in the following table based on the hazard conclusions presented in section 7.

Table 2. Type of risk characterisation required for the environment

Protection target	Type of risk characterisation	Hazard conclusion (see section 7)
Freshwater	Quantitative	PNEC aqua (freshwater) = 8.2 µg/L
Sediment (freshwater)	Quantitative	PNEC sediment (freshwater) = 0.065 mg/kg sediment dw
Marine water	Quantitative	PNEC aqua (marine water) = 0.82 µg/L
Sediment (marine water)	Quantitative	PNEC sediment (marine water) = 0.007 mg/kg sediment dw
Sewage treatment plant	Quantitative	PNEC STP = 10 mg/L
Air	Not needed	No hazard identified
Agricultural soil	Quantitative	PNEC soil = 0.008 mg/kg soil dw
Predator	Not needed	No potential for bioaccumulation

Comments on assessment approach:

The regional concentrations are reported in section 10.2.1.2 (see Table 85, “Predicted regional exposure concentrations (Regional PEC)”). The local Predicted Exposure Concentrations (PECs) reported for each contributing scenario correspond to the sum of the local concentrations (Clocal) and the regional concentrations (PEC regional).

9.0.2.2. Man via environment**Scope and type of assessment**

The scope of exposure assessment and type of risk characterisation required for man via the environment are described in the following table based on the hazard conclusions reported and justified in section 5.11.

Table 3. Type of risk characterisation required for man via the environment

Route of exposure and type of effects	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation: Systemic Long Term	Quantitative	DNEL (Derived No Effect Level) = 0.65 mg/m ³
Oral: Systemic Long Term	Quantitative	DNEL (Derived No Effect Level) = 0.13 mg/kg bw/day

9.0.2.3. Workers**Scope and type of assessment**

The scope of exposure assessment and type of risk characterisation required for workers are described in the following table based on the hazard conclusions presented in section 5.11.

Table 4. Type of risk characterisation required for workers

Route	Type of effect	Type of risk characterisation	Hazard conclusion (see section 5.11)
Inhalation	Systemic Long Term	Quantitative	DNEL (Derived No Effect Level) = 3.65 mg/m ³
	Systemic Acute	Quantitative	DNEL (Derived No Effect Level) = 45.6 mg/m ³
	Local Long Term	Quantitative	DNEL (Derived No Effect Level) = 2.92 mg/m ³
	Local Acute	Quantitative	DNEL (Derived No Effect Level) = 8.76

Route	Type of effect	Type of risk characterisation	Hazard conclusion (see section 5.11)
			mg/m ³
Dermal	Systemic Long Term	Quantitative	DNEL (Derived No Effect Level) = 0.26 mg/kg bw/day
	Systemic Acute	Quantitative	DNEL (Derived No Effect Level) = 4.7 mg/kg bw/day
	Local Long Term	Covered by systemic assessment	Hazard unknown (no further information necessary)
	Local Long Term	Covered by systemic assessment	Low hazard (no threshold derived)
Eye	Local	Low hazard	Low hazard (no threshold derived)

9.0.2.4. Consumers

Exposure assessment is not applicable as there are no consumer-related uses for the substance.

9.1. Exposure scenario 1 : Manufacture and formulation on production site

9.1. Exposure scenario 1 : Manufacture and formulation on production site

Environment contributing scenario(s):	
Manufacture	ERC 1
Worker contributing scenario(s):	
General exposure (closed system) - batch- with sample collection	PROC 3
Bull transfer dedicated activities	PROC 8b
Maintenance and waste management	PROC 8b

9.1.1. Environmental contributing scenario 1: Manufacture

9.1.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 49.95 tonnes/day
• Annual use at a site: <= 999 tonnes/year
• Percentage of European manufacture tonnage used at regional scale: = 100 %
• Fraction of main local source: 100%
• Emission Days (days/year):<300
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes (Water: 100%)
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Discharge rate of effluent
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.1.1.2. Releases

The local releases to the environment are reported in the following table.

Table 5. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Release factor	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day Explanation / Justification: There is not release to water. Process water from the production of DEHA, which contain small pollution load are subjected to on-site disposal Fenton process whereby all organic compounds are decomposed to carbon dioxide and water. The water is getting through the municipal sewage system for biological treatment.
Air	Release factor	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day Explanation / Justification: There is not release to air. Gases

Release	Release factor estimation method	Explanation / Justification
		from the cameras on the system are skolektorowane and prior to release to the atmosphere subjected to multistage purification systems (such as refrigeration and skrubingu) and as a result are completely cleaned of product DEHA
Soil	ERC based	Initial release factor: 0% Final release factor: 0% Local release rate: 0 kg/day Explanation / Justification: There is not release to soil.

9.1.1.3. Exposure and risks for the environment and man via the environment

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

Table 6. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	0	0
Sediment (freshwater)	0	0
Marine water	0	0
Sediment (marine water)	0	0
Sewage treatment plant	0	0
Agricultural soil	0	0
Man via Environment - Inhalation	0	0
Man via Environment - Oral	0	0
Man via environment - combined routes	0	0

Table 7. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	0	0
Fish	0	0
Leaf crops	0	0
Root crops	0	0
Meat	0	0
Milk	0	0

9.1.2. Worker contributing scenario 2: General exposure (closed system) - batch- with sample collection (PROC 3)

9.1.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour)	TRA Worker
• Containment: Closed batch process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
• Supplementary control of exposure: Sample via a closed loop or other system to avoid exposure [Effectiveness Inhal: 95%; Dermal: 95%]	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.1.2.2. Exposure and risks for workers

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

Table 8. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.153
Inhalation, systemic, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.049
Inhalation, local, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.191
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.002 mg/kg bw/day (TRA Worker)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.159
Combined routes, systemic, acute		RCR = 0.049

Conclusion on risk characterisation

Risk is controlled

9.1.3. Worker contributing scenario 3: Bull transfer dedicated activities (PROC 8b)

9.1.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Ensure material transfers are under containment or extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.1.3.2. Exposure and risks for workers

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

Table 9. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, systemic, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.122
Inhalation, local, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.477
Inhalation, local, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.636
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.513
Combined routes, systemic, acute		RCR = 0.122

Conclusion on risk characterisation

Risk is controlled

9.1.4. Worker contributing scenario 4: Maintenance and waste management (PROC 8b)

9.1.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: <1%	ECETOC TRA
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	ECETOC TRA
Technical and organisational conditions and measures	
• Containment: Semi-closed process with occasional controlled exposure	ECETOC TRA
• Occupational Health and Safety Management System: Advanced	ECETOC TRA
• Supplementary control of exposure: Drain down system prior to equipment break-in or maintenance [Effectiveness Inhal: 80%; Dermal: 80%]	ECETOC TRA
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	ECETOC TRA
• Respiratory Protection: No [Effectiveness Inhal: 0%]	ECETOC TRA
Other conditions affecting workers exposure	
• Place of use: Outdoor	ECETOC TRA
• Process temperature (for liquid): ≤ 40 °C	ECETOC TRA
• Skin surface potentially exposed: Two hands (960 cm ²)	ECETOC TRA

9.1.4.2. Exposure and risks for workers

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

Table 10. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.3 mg/m³ (ECETOC TRA)	RCR = 0.356
Inhalation, systemic, acute	5.2 mg/m³ (ECETOC TRA)	RCR = 0.114
Inhalation, local, long-term	1.3 mg/m³ (ECETOC TRA)	RCR = 0.445
Inhalation, local, acute	5.2 mg/m³ (ECETOC TRA)	RCR = 0.594
Dermal, systemic, long-term	0.013 mg/kg bw/day (ECETOC TRA)	RCR = 0.05
Combined routes, systemic, long-term		RCR = 0.406
Combined routes, systemic, acute		RCR = 0.114

Conclusion on risk characterisation

Risk is controlled

9.2. Exposure scenario 2 : Distribution

Environment contributing scenario(s):	
Distribution	ERC 2
Worker contributing scenario(s):	
Bulk transfert - dedicated activities	PROC 8b
Small package filling	PROC 9

9.2.1. Environmental contributing scenario 1: Distribution

9.2.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 10 tonnes/day
• Annual use at a site: <= 1E3 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
• Emission Days (days/year): 100 days/year
• European tonnage: 2E3 Tonnes
• Fraction of main local source: 0.5
Conditions and measures related to sewage treatment plant
• Municipal STP: No [Effectiveness Water: 0%]
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Discharge rate of effluent: >= 2E3 m3/d
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.2.1.2. Releases

The local releases to the environment are reported in the following table.

Table 11. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Release factor	Initial release factor: 1E-4% Final release factor: 1E-4% Local release rate: 0.01 kg/day Explanation / Justification: Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of: 99.9%
Air	Release factor	Initial release factor: 0.5% Final release factor: 0.5% Local release rate: 50 kg/day Explanation / Justification: Treat air emission to provide a typical removal efficiency of: 99.5%
Soil	Release factor	Final release factor: 0% Explanation / Justification: Soil emission controls are not applicable as there is no direct release to soil.

9.2.1.3. Exposure and risks for the environment and man via the environment

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

Table 12. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 6.469E-4 mg/L	RCR = 0.079
Sediment (freshwater)	Local PEC: 0.005 mg/kg dw	RCR = 0.079
Marine water	Local PEC: 6.505E-5 mg/L	RCR = 0.079
Sediment (marine water)	Local PEC: 5.169E-4 mg/kg dw	RCR = 0.079
Sewage treatment plant	Local PEC: 0 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 0.006 mg/kg dw	RCR = 0.77
Man via Environment - Inhalation	Local PEC: 0.004 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 0.002 mg/kg bw/day	RCR = 0.019
Man via environment - combined routes		RCR = 0.025

Table 13. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	1.8E-4 mg/kg bw/day	0.006 mg/L
Fish	6.588E-7 mg/kg bw/day	4.01E-4 mg/kg ww
Leaf crops	0.002 mg/kg bw/day	0.132 mg/kg ww
Root crops	3.356E-5 mg/kg bw/day	0.006 mg/kg ww
Meat	3.331E-8 mg/kg bw/day	7.748E-6 mg/kg ww
Milk	6.209E-7 mg/kg bw/day	7.748E-5 mg/kg ww

9.2.2. Worker contributing scenario 1: Bulk transfert - dedicated activities (PROC 8b)

9.2.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker

	Method
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.2.2.2. Exposure and risks for workers

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

Table 14. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, systemic, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.122
Inhalation, local, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.477
Inhalation, local, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.636
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.513
Combined routes, systemic, acute		RCR = 0.122

Conclusion on risk characterisation

Risk is controlled

9.2.3. Worker contributing scenario 2: Small package filling (PROC 9)

9.2.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with	TRA Worker

	Method
APF of 10) [Effectiveness Inhal: 90%]	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.2.3.2. Exposure and risks for workers

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

Table 15. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.069 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.569
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.3. Exposure scenario 3 : Formulation

Environment contributing scenario(s):	
Formulation	ERC 2
Worker contributing scenario(s):	
General exposure (closed system)	PROC 1
General exposure (closed system) with sample collection	PROC 2
General exposure (closed system) - batch- with sample collection	PROC 3
General exposure (open system)- batch- with sample collection	PROC 4
Mixing	PROC 5
Bulk transfert non dedicated activities	PROC 8a
Bulk transfert dedicated facilities	PROC 8b
Small package filling	PROC 9
Production of preparation or articles	PROC 14
Laboratory activities	PROC 15

9.3.1. Environmental contributing scenario 1: Formulation

9.3.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 10 tonnes/day
• Annual use at a site: <= 1E3 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
• Emission Days (days/year): 100 days/year
• European tonnage: 2E3 Tonnes
• Fraction of main local source: 0.5
Conditions and measures related to sewage treatment plant
• Municipal STP: No [Effectiveness Water: 0%]
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Discharge rate of effluent: >= 2E3 m3/d
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.3.1.2. Releases

The local releases to the environment are reported in the following table.

Table 16. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Release factor	Initial release factor: 1E-4% Final release factor: 1E-4% Local release rate: 0.01 kg/day Explanation / Justification: Treat onsite wastewater (prior to receiving water discharge) to provide the required removal

Release	Release factor estimation method	Explanation / Justification
		efficiency of:99.9%
Air	Release factor	Initial release factor: 0.5% Final release factor: 0.5% Local release rate: 50 kg/day Explanation / Justification: Treat air emission to provide a typical removal efficiency of:99.5%
Soil	Release factor	Final release factor: 0% Explanation / Justification: Soil emission controls are not applicable as there is no direct release to soil.

9.3.1.3. Exposure and risks for the environment and man via the environment

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

Table 17. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 6.469E-4 mg/L	RCR = 0.079
Sediment (freshwater)	Local PEC: 0.005 mg/kg dw	RCR = 0.079
Marine water	Local PEC: 6.505E-5 mg/L	RCR = 0.079
Sediment (marine water)	Local PEC: 5.169E-4 mg/kg dw	RCR = 0.079
Sewage treatment plant	Local PEC: 0 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 0.006 mg/kg dw	RCR = 0.77
Man via Environment - Inhalation	Local PEC: 0.004 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 0.002 mg/kg bw/day	RCR = 0.019
Man via environment - combined routes		RCR = 0.025

Table 18. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	1.8E-4 mg/kg bw/day	0.006 mg/L
Fish	6.588E-7 mg/kg bw/day	4.01E-4 mg/kg ww
Leaf crops	0.002 mg/kg bw/day	0.132 mg/kg ww
Root crops	3.356E-5 mg/kg bw/day	0.006 mg/kg ww
Meat	3.331E-8 mg/kg bw/day	7.748E-6 mg/kg ww
Milk	6.209E-7 mg/kg bw/day	7.748E-5 mg/kg ww

9.3.2. Worker contributing scenario 1: General exposure (closed system) (PROC 1)

9.3.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker

	Method
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Closed system (minimal contact during routine operations)	TRA Worker
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.3.2.2. Exposure and risks for workers

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

Table 19. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.01
Inhalation, systemic, acute	0.149 mg/m³ (TRA Worker)	RCR < 0.01
Inhalation, local, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.013
Inhalation, local, acute	0.149 mg/m³ (TRA Worker)	RCR = 0.017
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.131
Combined routes, systemic, long-term		RCR = 0.141
Combined routes, systemic, acute		RCR < 0.01

Conclusion on risk characterisation

Risk is controlled

9.3.3. Worker contributing scenario 2: General exposure (closed system) with sample collection (PROC 2)

9.3.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed continuous process with occasional controlled exposure	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.3.3.2. Exposure and risks for workers

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

Table 20. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.153
Inhalation, systemic, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.049
Inhalation, local, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.191
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.068 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.416
Combined routes, systemic, acute		RCR = 0.049

Conclusion on risk characterisation

Risk is controlled

9.3.4. Worker contributing scenario 3: General exposure (closed system) - batch- with sample collection (PROC 3)

9.3.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed batch process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker

	Method
<i>Provide extract ventilation to points where emissions occur</i>	
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.3.4.2. Exposure and risks for workers

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

Table 21. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.133
Combined routes, systemic, long-term		RCR = 0.438
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.3.5. Worker contributing scenario 4: General exposure (open system)- batch- with sample collection (PROC 4)

9.3.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker

	Method
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.3.5.2. Exposure and risks for workers

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

Table 22. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.61
Inhalation, systemic, acute	8.914 mg/m³ (TRA Worker)	RCR = 0.196
Inhalation, local, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.763
Inhalation, local, acute	0.891 mg/m³ (TRA Worker)	RCR = 0.101
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.742
Combined routes, systemic, acute		RCR = 0.196

Conclusion on risk characterisation

Risk is controlled

9.3.6. Worker contributing scenario 5: Mixing (PROC 5)

9.3.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker

	Method
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.3.6.2. Exposure and risks for workers

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

Table 23. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.137 mg/kg bw/day (TRA Worker)	RCR = 0.527
Combined routes, systemic, long-term		RCR = 0.833
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.3.7. Worker contributing scenario 6: Bulk transfert non dedicated activities (PROC 8a)

9.3.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Good general ventilation (3-5 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker

	Method
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.3.7.2. Exposure and risks for workers

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

Table 24. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.78 mg/m³ (TRA Worker)	RCR = 0.214
Inhalation, systemic, acute	5.2 mg/m³ (TRA Worker)	RCR = 0.114
Inhalation, local, long-term	0.78 mg/m³ (TRA Worker)	RCR = 0.267
Inhalation, local, acute	5.2 mg/m³ (TRA Worker)	RCR = 0.594
Dermal, systemic, long-term	0.082 mg/kg bw/day (TRA Worker)	RCR = 0.316
Combined routes, systemic, long-term		RCR = 0.53
Combined routes, systemic, acute		RCR = 0.114

Conclusion on risk characterisation

Risk is controlled

9.3.8. Worker contributing scenario 7: Bulk transfert dedicated facilities (PROC 8b)

9.3.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Provide extract ventilation to material transfer points and other openings</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.3.8.2. Exposure and risks for workers

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

Table 25. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, systemic, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.122
Inhalation, local, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.477
Inhalation, local, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.636
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.513
Combined routes, systemic, acute		RCR = 0.122

Conclusion on risk characterisation

Risk is controlled

9.3.9. Worker contributing scenario 8: Small package filling (PROC 9)

9.3.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	

	Method
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.3.9.2. Exposure and risks for workers

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

Table 26. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.069 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.569
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.3.10. Worker contributing scenario 9: Production of preparation or articles (PROC 14)

9.3.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker

	Method
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.3.10.2. Exposure and risks for workers

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

Table 27. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.062 mg/kg bw/day (TRA Worker)	RCR = 0.238
Combined routes, systemic, long-term		RCR = 0.787
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.3.11. Worker contributing scenario 10: Laboratory activities (PROC 15)

9.3.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Handle in a fume cupboard or under extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.3.11.2. Exposure and risks for workers

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

Table 28. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.017 mg/kg bw/day (TRA Worker)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.371
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.4. Exposure scenario 4 : Use as processing aid (water treatment)

Environment contributing scenario(s):	
Use as processing aid	ERC 6b
Worker contributing scenario(s):	
General exposure (closed system)	PROC 1
General exposure (closed system) with sample collection	PROC 2
General exposure (closed system) - batch- with sample collection	PROC 3
General exposure (open system)- batch- with sample collection	PROC 4
Calendering	PROC 6
Spraying	PROC 7
Bulk transfert non dedicated activities	PROC 8a
Bulk transfert dedicated facilities	PROC 8b
Small package filling	PROC 9
Treatment of articles	PROC 13
Production of preparation or articles	PROC 14
Laboratory activities	PROC 15

9.4.1. Environmental contributing scenario 1: Use as processing aid

9.4.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 9.2 tonnes/day
• Annual use at a site: <= 920 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
• Emission Days (days/year): 100 days/year
• Fraction of main local source: 1 <i>Worst case scenario</i>
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 0.672%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: No
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.4.1.2. Releases

The local releases to the environment are reported in the following table.

Table 29. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Measured release (EMISSION SCENARIO DOCUMENT ON WATER TREATMENT CHEMICALS)	Final release factor: 7.174E-8% Local release rate: 6.6E-6 kg/day Explanation / Justification: Based on OECD SERIES ON EMISSION SCENARIO DOCUMENTS Number 4 / EMISSION SCENARIO DOCUMENT ON WATER TREATMENT CHEMICALS: In closed systems there should be little loss of water, thus requiring small amounts of make up water. A closed system, following routine monitoring and treatment programmes, is expected to lose approximately 1% of the system volume per month. Typical maximum capacity range of system using diethylhydroxylamine is 2000 Liters (UK/france data). Therefore a loss of 0.66 Liters/day of wastewater can be reasonably estimated. The use concentration of diethylhydroxylamine is estimated between 1 to 10 mg/L. Worst case scenario is a local release rate of 6.6E-6 kg/day of diethylhydroxylamine in waste water
Air	ERC based	Initial release factor: 0.1% Final release factor: 0.1% Local release rate: 9.2 kg/day
Soil	ERC based	Final release factor: 0.025%

9.4.1.3. Exposure and risks for the environment and man via the environment

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

Table 30. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 1.472E-4 mg/L	RCR = 0.018
Sediment (freshwater)	Local PEC: 0.001 mg/kg dw	RCR = 0.018
Marine water	Local PEC: 1.508E-5 mg/L	RCR = 0.018
Sediment (marine water)	Local PEC: 1.199E-4 mg/kg dw	RCR = 0.018
Sewage treatment plant	Local PEC: 3.278E-6 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 0.001 mg/kg dw	RCR = 0.151
Man via Environment - Inhalation	Local PEC: 7.023E-4 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 4.604E-4 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 31. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	3.538E-5 mg/kg bw/day	0.001 mg/L
Fish	3.411E-7 mg/kg bw/day	2.076E-4 mg/kg ww
Leaf crops	4.18E-4 mg/kg bw/day	0.024 mg/kg ww
Root crops	6.598E-6 mg/kg bw/day	0.001 mg/kg ww
Meat	6.156E-9 mg/kg bw/day	1.432E-6 mg/kg ww
Milk	1.147E-7 mg/kg bw/day	1.432E-5 mg/kg ww

9.4.2. Worker contributing scenario 1: General exposure (closed system) (PROC 1)

9.4.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Closed system (minimal contact during routine operations)	TRA Worker
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.4.2.2. Exposure and risks for workers

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

Table 32. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.01
Inhalation, systemic, acute	0.149 mg/m³ (TRA Worker)	RCR < 0.01
Inhalation, local, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.013
Inhalation, local, acute	0.149 mg/m³ (TRA Worker)	RCR = 0.017
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.131
Combined routes, systemic, long-term		RCR = 0.141
Combined routes, systemic, acute		RCR < 0.01

Conclusion on risk characterisation

Risk is controlled

9.4.3. Worker contributing scenario 2: General exposure (closed system) with sample collection (PROC 2)

9.4.3.1. Conditions of use

	Method
Product (article) characteristics	

	Method
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed continuous process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.4.3.2. Exposure and risks for workers

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

Table 33. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.153
Inhalation, systemic, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.049
Inhalation, local, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.191
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.068 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.416
Combined routes, systemic, acute		RCR = 0.049

Conclusion on risk characterisation

Risk is controlled

9.4.4. Worker contributing scenario 3: General exposure (closed system) - batch- with sample collection (PROC 3)

9.4.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed batch process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.4.4.2. Exposure and risks for workers

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

Table 34. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.133
Combined routes, systemic, long-term		RCR = 0.438
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.4.5. Worker contributing scenario 4: General exposure (open system)- batch- with sample collection (PROC 4)

9.4.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.4.5.2. Exposure and risks for workers

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

Table 35. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.61
Inhalation, systemic, acute	8.914 mg/m³ (TRA Worker)	RCR = 0.196
Inhalation, local, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.763
Inhalation, local, acute	0.891 mg/m³ (TRA Worker)	RCR = 0.101
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.742
Combined routes, systemic, acute		RCR = 0.196

Conclusion on risk characterisation

Risk is controlled

9.4.6. Worker contributing scenario 5: Calendering (PROC 6)

9.4.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
<ul style="list-style-type: none"> Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
<ul style="list-style-type: none"> Containment: No 	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%] 	TRA Worker
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced 	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%] 	TRA Worker
<ul style="list-style-type: none"> Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%] 	TRA Worker
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> Place of use: Indoor 	TRA Worker
<ul style="list-style-type: none"> Skin surface potentially exposed: Two hands (960 cm²) 	TRA Worker

9.4.6.2. Exposure and risks for workers

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

Table 36. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.049 mg/kg bw/day (TRA Worker)	RCR = 0.19
Combined routes, systemic, long-term		RCR = 0.739
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.4.7. Worker contributing scenario 6: Spraying (PROC 7)

9.4.7.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
<ul style="list-style-type: none"> Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
<ul style="list-style-type: none"> Containment: No 	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Use an extract ventilation to minimize exposure</i>	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%] 	TRA Worker
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced 	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%] 	TRA Worker
<ul style="list-style-type: none"> Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%] 	TRA Worker
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> Place of use: Indoor 	TRA Worker
<ul style="list-style-type: none"> Process temperature (for liquid): <= 40 °C 	TRA Worker
<ul style="list-style-type: none"> Skin surface potentially exposed: Two hands and upper wrists (1500 cm²) 	TRA Worker

9.4.7.2. Exposure and risks for workers

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

Table 37. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.671 mg/m³ (TRA Worker)	RCR = 0.458
Inhalation, systemic, acute	33.43 mg/m³ (TRA Worker)	RCR = 0.733
Inhalation, local, long-term	1.671 mg/m³ (TRA Worker)	RCR = 0.572
Inhalation, local, acute	3.343 mg/m³ (TRA Worker)	RCR = 0.381
Dermal, systemic, long-term	0.013 mg/kg bw/day (TRA Worker)	RCR = 0.049
Combined routes, systemic, long-term		RCR = 0.507
Combined routes, systemic, acute		RCR = 0.733

Conclusion on risk characterisation

Risk is controlled

9.4.8. Worker contributing scenario 7: Bulk transfert non dedicated activities (PROC 8a)

9.4.8.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> Concentration of substance in mixture: Substance as such 	TRA Worker

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Good general ventilation (3-5 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.4.8.2. Exposure and risks for workers

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

Table 38. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.107
Inhalation, systemic, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.057
Inhalation, local, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.134
Inhalation, local, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.297
Dermal, systemic, long-term	0.082 mg/kg bw/day (TRA Worker)	RCR = 0.316
Combined routes, systemic, long-term		RCR = 0.423
Combined routes, systemic, acute		RCR = 0.057

Conclusion on risk characterisation

Risk is controlled

9.4.9. Worker contributing scenario 8: Bulk transfert dedicated facilities (PROC 8b)

9.4.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker

	Method
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.4.9.2. Exposure and risks for workers

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

Table 39. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, systemic, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.122
Inhalation, local, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.477
Inhalation, local, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.636
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.513
Combined routes, systemic, acute		RCR = 0.122

Conclusion on risk characterisation

Risk is controlled

9.4.10. Worker contributing scenario 8: Small package filling (PROC 9)

9.4.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.4.10.2. Exposure and risks for workers

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

Table 40. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.069 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.569
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.4.11. Worker contributing scenario 9: Treatment of articles (PROC 13)

9.4.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker

	Method
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.4.11.2. Exposure and risks for workers

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

Table 41. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.025 mg/kg bw/day (TRA Worker)	RCR = 0.095
Combined routes, systemic, long-term		RCR = 0.644
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.4.12. Worker contributing scenario 10: Production of preparation or articles (PROC 14)

9.4.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
<ul style="list-style-type: none"> Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
<ul style="list-style-type: none"> Containment: No 	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%] 	TRA Worker
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Advanced 	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%] 	TRA Worker
<ul style="list-style-type: none"> Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%] 	TRA Worker
Other conditions affecting workers exposure	
<ul style="list-style-type: none"> Place of use: Indoor 	TRA Worker
<ul style="list-style-type: none"> Process temperature (for liquid): <= 40 °C 	TRA Worker
<ul style="list-style-type: none"> Skin surface potentially exposed: Two hands face (480 cm²) 	TRA Worker

9.4.12.2. Exposure and risks for workers

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

Table 42. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.062 mg/kg bw/day (TRA Worker)	RCR = 0.238
Combined routes, systemic, long-term		RCR = 0.787
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.4.13. Worker contributing scenario 11: Laboratory activities (PROC 15)

9.4.13.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> Concentration of substance in mixture: Substance as such 	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Handle in a fume cupboard or under extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.4.13.2. Exposure and risks for workers

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

Table 43. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.017 mg/kg bw/day (TRA Worker)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.371
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.5. Exposure scenario 5 : Polymer processing

Environment contributing scenario(s):	
Polymer processing	ERC 6d
Worker contributing scenario(s):	
General exposure (closed system)	PROC 1
General exposure (closed system) with sample collection	PROC 2
General exposure (closed system) - batch- with sample collection	PROC 3
General exposure (open system)- batch- with sample collection	PROC 4
Mixing	PROC 5
Calendering	PROC 6
Spraying	PROC 7
Bulk transfert non dedicated activities	PROC 8a
Bulk transfert dedicated facilities	PROC 8b
Small package filling	PROC 9
Treatment of articles	PROC 13
Laboratory activities	PROC 15
Production of preparation or articles	PROC 14

9.5.1. Environmental contributing scenario 1: Polymer processing

9.5.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: <= 9.2 tonnes/day
• Annual use at a site: <= 920 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
• Emission Days (days/year): 100 days/year
• Fraction of main local source: 1 <i>Worst case scenario</i>
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 0.672%]
• Discharge rate of STP: >= 2E3 m3/d
• Application of the STP sludge on agricultural soil: No <i>Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.</i>
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 1.8E4 m3/d

9.5.1.2. Releases

The local releases to the environment are reported in the following table.

Table 44. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	Release factor	Initial release factor: 0.001% Final release factor: 0.001% Local release rate: 0.092 kg/day Explanation / Justification: Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of :99.99%
Air	Release factor	Initial release factor: 0.5% Final release factor: 0.5% Local release rate: 46 kg/day Explanation / Justification: Treat air emission to provide a typical removal efficiency of 99.5%
Soil	Release factor	Final release factor: 0% Explanation / Justification: Soil emission controls are not applicable as there is no direct release to soil.

9.5.1.3. Exposure and risks for the environment and man via the environment

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

Table 45. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 0.005 mg/L	RCR = 0.575
Sediment (freshwater)	Local PEC: 0.037 mg/kg dw	RCR = 0.575
Marine water	Local PEC: 4.719E-4 mg/L	RCR = 0.576
Sediment (marine water)	Local PEC: 0.004 mg/kg dw	RCR = 0.575
Sewage treatment plant	Local PEC: 0.046 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 0.006 mg/kg dw	RCR = 0.71
Man via Environment - Inhalation	Local PEC: 0.004 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 0.002 mg/kg bw/day	RCR = 0.018
Man via environment - combined routes		RCR = 0.023

Table 46. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	1.658E-4 mg/kg bw/day	0.006 mg/L
Fish	3.246E-6 mg/kg bw/day	0.002 mg/kg ww
Leaf crops	0.002 mg/kg bw/day	0.122 mg/kg ww
Root crops	3.092E-5 mg/kg bw/day	0.006 mg/kg ww
Meat	3.065E-8 mg/kg bw/day	7.128E-6 mg/kg ww
Milk	5.713E-7 mg/kg bw/day	7.128E-5 mg/kg ww

9.5.2. Worker contributing scenario 1: General exposure (closed system) (PROC 1)

9.5.2.1. Conditions of use

	Method

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Closed system (minimal contact during routine operations)	TRA Worker
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.5.2.2. Exposure and risks for workers

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

Table 47. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.01
Inhalation, systemic, acute	0.149 mg/m³ (TRA Worker)	RCR < 0.01
Inhalation, local, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.013
Inhalation, local, acute	0.149 mg/m³ (TRA Worker)	RCR = 0.017
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.131
Combined routes, systemic, long-term		RCR = 0.141
Combined routes, systemic, acute		RCR < 0.01

Conclusion on risk characterisation

Risk is controlled

9.5.3. Worker contributing scenario 2: General exposure (closed system) with sample collection (PROC 2)

9.5.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker

	Method
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed continuous process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.3.2. Exposure and risks for workers

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

Table 48. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.153
Inhalation, systemic, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.049
Inhalation, local, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.191
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.068 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.416
Combined routes, systemic, acute		RCR = 0.049

Conclusion on risk characterisation

Risk is controlled

9.5.4. Worker contributing scenario 3: General exposure (closed system) - batch- with sample collection (PROC 3)

9.5.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed batch process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.5.4.2. Exposure and risks for workers

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

Table 49. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.133
Combined routes, systemic, long-term		RCR = 0.438
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.5.5. Worker contributing scenario 4: General exposure (open system)- batch- with sample collection (PROC 4)

9.5.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour)	TRA Worker

	Method
<i>Provide enhanced general ventilation by mechanical means</i>	
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.5.2. Exposure and risks for workers

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

Table 50. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.61
Inhalation, systemic, acute	8.914 mg/m³ (TRA Worker)	RCR = 0.196
Inhalation, local, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.763
Inhalation, local, acute	0.8914 mg/m³ (TRA Worker)	RCR = 0.101
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.742
Combined routes, systemic, acute		RCR = 0.196

Conclusion on risk characterisation

Risk is controlled

9.5.6. Worker contributing scenario 5: Mixing (PROC 5)

9.5.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour)	TRA Worker

	Method
<i>Provide enhanced general ventilation by mechanical means</i>	
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.6.2. Exposure and risks for workers

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

Table 51. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.137 mg/kg bw/day (TRA Worker)	RCR = 0.527
Combined routes, systemic, long-term		RCR = 0.833
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.5.7. Worker contributing scenario 6: Calendering (PROC 6)

9.5.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.5.7.2. Exposure and risks for workers

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

Table 52. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.049 mg/kg bw/day (TRA Worker)	RCR = 0.19
Combined routes, systemic, long-term		RCR = 0.739
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.5.8. Worker contributing scenario 6: Spraying (PROC 7)

9.5.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Use an extract ventilation to minimize exposure</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm ²)	TRA Worker

9.5.8.2. Exposure and risks for workers

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

Table 53. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.671 mg/m³ (TRA Worker)	RCR = 0.458
Inhalation, systemic, acute	33.43 mg/m³ (TRA Worker)	RCR = 0.733
Inhalation, local, long-term	1.671 mg/m³ (TRA Worker)	RCR = 0.572
Inhalation, local, acute	3.343 mg/m³ (TRA Worker)	RCR = 0.381
Dermal, systemic, long-term	0.013 mg/kg bw/day (TRA Worker)	RCR = 0.049
Combined routes, systemic, long-term		RCR = 0.507
Combined routes, systemic, acute		RCR = 0.733

Conclusion on risk characterisation

Risk is controlled

9.5.9. Worker contributing scenario 8: Bulk transfert non dedicated activities (PROC 8a)

9.5.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Good general ventilation (3-5 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.5.9.2. Exposure and risks for workers

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

Table 54. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.107
Inhalation, systemic, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.057
Inhalation, local, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.134
Inhalation, local, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.297
Dermal, systemic, long-term	0.082 mg/kg bw/day (TRA Worker)	RCR = 0.316
Combined routes, systemic, long-term		RCR = 0.423
Combined routes, systemic, acute		RCR = 0.057

Conclusion on risk characterisation

Risk is controlled.

9.5.10. Worker contributing scenario 7: Bulk transfert dedicated facilities (PROC 8b)

9.5.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker

	Method
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.5.10.2. Exposure and risks for workers

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

Table 55. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, systemic, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.122
Inhalation, local, long-term	1.393 mg/m³ (TRA Worker)	RCR = 0.477
Inhalation, local, acute	5.571 mg/m³ (TRA Worker)	RCR = 0.636
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.513
Combined routes, systemic, acute		RCR = 0.122

Conclusion on risk characterisation

Risk is controlled

9.5.11. Worker contributing scenario 8: Small package filling (PROC 9)

9.5.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.11.2. Exposure and risks for workers

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

Table 56. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.069 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.569
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.5.12. Worker contributing scenario 11: Treatment of articles (PROC 13)

9.5.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker

	Method
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.12.2. Exposure and risks for workers

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

Table 57. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.025 mg/kg bw/day (TRA Worker)	RCR = 0.095
Combined routes, systemic, long-term		RCR = 0.644
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.5.13. Worker contributing scenario 13: Production of preparation or articles (PROC 14)

9.5.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	

	Method
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.5.13.2. Exposure and risks for workers

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

Table 58. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.062 mg/kg bw/day (TRA Worker)	RCR = 0.238
Combined routes, systemic, long-term		RCR = 0.787
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.5.14. Worker contributing scenario 12: Laboratory activities (PROC 15)

9.5.14.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour)	TRA Worker

	Method
<i>Provide enhanced general ventilation by mechanical means</i>	
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Handle in a fume cupboard or under extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.5.14.2. Exposure and risks for workers

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

Table 59. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.017 mg/kg bw/day (TRA Worker)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.371
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.6. Exposure scenario 6 : Colour stabilizer (film/photographic industry)

Environment contributing scenario(s):	
Colour stabilizer (film/photographic industry)	ERC 8b
Worker contributing scenario(s):	
Bulk transfert non dedicated facilities	PROC 8a
Bulk transfert dedicated facilities	PROC 8b
Small package filling	PROC 9
Roller application or brushing	PROC 10
Spraying (non industrial)	PROC 11
Laboratory activities	PROC 15

9.6.1. Environmental contributing scenario 1: Colour stabilizer (film/photographic industry)

9.6.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily wide dispersive use: $\leq 4.4E-5$ tonnes/day
• Percentage of tonnage used at regional scale: = 10 %
• Emission Days (days/year):365 days/year
• Fraction of main local source: 0.002
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 0.672%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: Yes
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

9.6.1.2. Releases

The local releases to the environment are reported in the following table.

Table 60. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	ERC based	Initial release factor: 2% Final release factor: 2% Local release rate: 8.8E-4 kg/day
Air	ERC based	Initial release factor: 0.1% Final release factor: 0.1%
Soil	ERC based	Final release factor: 0%

9.6.1.3. Exposure and risks for the environment and man via the environment

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

Table 61. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 1.906E-4 mg/L	RCR = 0.023
Sediment (freshwater)	Local PEC: 0.002 mg/kg dw	RCR = 0.023
Marine water	Local PEC: 1.942E-5 mg/L	RCR = 0.024
Sediment (marine water)	Local PEC: 1.543E-4 mg/kg dw	RCR = 0.024
Sewage treatment plant	Local PEC: 4.37E-4 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 1.121E-4 mg/kg dw	RCR = 0.014
Man via Environment - Inhalation	Local PEC: 1.594E-6 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 7.477E-6 mg/kg bw/day	RCR < 0.01
Man via environment - combined routes		RCR < 0.01

Table 62. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	5.446E-6 mg/kg bw/day	1.906E-4 mg/L
Fish	4.423E-7 mg/kg bw/day	2.692E-4 mg/kg ww
Leaf crops	1.007E-6 mg/kg bw/day	5.873E-5 mg/kg ww
Root crops	5.81E-7 mg/kg bw/day	1.059E-4 mg/kg ww
Meat	5.01E-11 mg/kg bw/day	1.165E-8 mg/kg ww
Milk	9.338E-10 mg/kg bw/day	1.165E-7 mg/kg ww

9.6.2. Worker contributing scenario 1: Bulk transfert non dedicated facilities (PROC 8a)

9.6.2.1. Conditions of use

	Method
Product (article) characteristics	
<ul style="list-style-type: none"> Concentration of substance in mixture: 1-5% <i>Limit the substance content in the product to 5 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
<ul style="list-style-type: none"> Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
<ul style="list-style-type: none"> General ventilation: Basic general ventilation (1-3 air changes per hour) 	TRA Worker
<ul style="list-style-type: none"> Containment: Semi-closed process with occasional controlled exposure 	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation: yes [Effectiveness Inhal: 80%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
<ul style="list-style-type: none"> Local exhaust ventilation (for dermal):no [Effectiveness Inhal: 0%] 	TRA Worker
<ul style="list-style-type: none"> Occupational Health and Safety Management System: Basic 	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
<ul style="list-style-type: none"> Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%] 	TRA Worker
<ul style="list-style-type: none"> Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%] 	TRA Worker
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.6.2.2. Exposure and risks for workers

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

Table 63. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.081
Inhalation, systemic, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.13
Inhalation, local, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.102
Inhalation, local, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.678
Dermal, systemic, long-term	0.055 mg/kg bw/day (TRA Worker)	RCR = 0.211
Combined routes, systemic, long-term		RCR = 0.292
Combined routes, systemic, acute		RCR = 0.13

Conclusion on risk characterisation

Risk is controlled

9.6.3. Worker contributing scenario 2: Bulk transfert dedicated facilities (PROC 8b)

9.6.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5% <i>Limit the substance content in the product to 5 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Basic	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	

	Method
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.6.3.2. Exposure and risks for workers

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

Table 64. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.074 mg/m³ (TRA Worker)	RCR = 0.02
Inhalation, systemic, acute	1.486 mg/m³ (TRA Worker)	RCR = 0.033
Inhalation, local, long-term	0.074 mg/m³ (TRA Worker)	RCR = 0.025
Inhalation, local, acute	1.486 mg/m³ (TRA Worker)	RCR = 0.17
Dermal, systemic, long-term	0.055 mg/kg bw/day (TRA Worker)	RCR = 0.211
Combined routes, systemic, long-term		RCR = 0.231
Combined routes, systemic, acute		RCR = 0.033

Conclusion on risk characterisation

Risk is controlled

9.6.4. Worker contributing scenario 3: Small package filling (PROC 9)

9.6.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5% <i>Limit the substance content in the product to 5 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Basic	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%] <i>Wear a respirator conforming to EN140 with Type A filter or better.</i>	TRA Worker

	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.6.4.2. Exposure and risks for workers

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

Table 65. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.081
Inhalation, systemic, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.13
Inhalation, local, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.102
Inhalation, local, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.678
Dermal, systemic, long-term	0.027 mg/kg bw/day (TRA Worker)	RCR = 0.106
Combined routes, systemic, long-term		RCR = 0.187
Combined routes, systemic, acute		RCR = 0.13

Conclusion on risk characterisation

Risk is controlled

9.6.5. Worker contributing scenario 4: Roller application or brushing (PROC 10)

9.6.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5% <i>Limit the substance content in the product to 5 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] <i>Use extract ventilation to minimize exposure</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Basic	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker

	Method
<i>Wear a respirator conforming to EN140 with Type A filter or better.</i>	
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): ≤ 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.6.5.2. Exposure and risks for workers

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

Table 66. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.081
Inhalation, systemic, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.13
Inhalation, local, long-term	0.297 mg/m³ (TRA Worker)	RCR = 0.102
Inhalation, local, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.678
Dermal, systemic, long-term	0.11 mg/kg bw/day (TRA Worker)	RCR = 0.422
Combined routes, systemic, long-term		RCR = 0.503
Combined routes, systemic, acute		RCR = 0.13

Conclusion on risk characterisation

Risk is controlled

9.6.6. Worker contributing scenario 5: Spraying (non industrial) (PROC 11)

9.6.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: <1% <i>Limit the substance content in the product to 1 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%]	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 80%] <i>Use extract ventilation to minimize exposure</i>	TRA Worker
• Occupational Health and Safety Management System: Basic	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker

	Method
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm ²)	TRA Worker

9.6.6.2. Exposure and risks for workers

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

Table 67. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	7.428 mg/m³ (TRA Worker)	RCR = 0.163
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	7.428 mg/m³ (TRA Worker)	RCR = 0.848
Dermal, systemic, long-term	0.129 mg/kg bw/day (TRA Worker)	RCR = 0.495
Combined routes, systemic, long-term		RCR = 0.8
Combined routes, systemic, acute		RCR = 0.163

Conclusion on risk characterisation

Risk is controlled

9.6.7. Worker contributing scenario 6: Laboratory activities (PROC 15)

9.6.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 1-5% <i>Limit the substance content in the product to 5 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 80%] <i>Handle in a fume cupboard or under extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Basic	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker

	Method
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.6.7.2. Exposure and risks for workers

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

Table 68. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.486 mg/m³ (TRA Worker)	RCR = 0.407
Inhalation, systemic, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.13
Inhalation, local, long-term	1.486 mg/m³ (TRA Worker)	RCR = 0.509
Inhalation, local, acute	5.942 mg/m³ (TRA Worker)	RCR = 0.678
Dermal, systemic, long-term	0.007 mg/kg bw/day (TRA Worker)	RCR = 0.026
Combined routes, systemic, long-term		RCR = 0.433
Combined routes, systemic, acute		RCR = 0.13

Conclusion on risk characterisation

Risk is controlled

9.7. Exposure scenario 7 : Colour stabilizer for chemical products (fuel, resins, etc.) and for de-colourisation of phenols

Environment contributing scenario(s):	
Colour stabilizer for chemical products (fuel, resins, etc.) and for de-colourisation of phenols	ERC 6d
Worker contributing scenario(s):	
General exposure (closed system)	PROC 1
General exposure (closed system) with sample collection	PROC 2
General exposure (closed system) - batch- with sample collection	PROC 3
General exposure (open system)- batch- with sample collection	PROC 4
Calendering	PROC 6
Spraying	PROC 7
Bulk transfert non dedicated activities	PROC 8a
Bulk transfert dedicated facilities	PROC 8b
Small package filling	PROC 9
Treatment of articles	PROC 13
Production of preparation or articles	PROC 14
Laboratory activities	PROC 15

9.7.1. Environmental contributing scenario 1: Colour stabilizer for chemical products (fuel, resins, etc.) and for de-colourisation of phenols

9.7.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use at site: ≤ 0.8 tonnes/day
• Annual use at a site: ≤ 80 tonnes/year
• Percentage of tonnage used at regional scale: = 100 %
• Emission Days (days/year): 100 days/year
Conditions and measures related to sewage treatment plant
• Municipal STP: Yes [Effectiveness Water: 0.672%]
• Discharge rate of STP: $\geq 2E3$ m ³ /d
• Application of the STP sludge on agricultural soil: No <i>Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.</i>
Conditions and measures related to treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) (ERC based assessment demonstrating control of risk with default conditions. Low risk assumed for waste life stage. Waste disposal according to national/local legislation is sufficient.)
Other conditions affecting environmental exposure
• Receiving surface water flow rate: $\geq 1.8E4$ m ³ /d

9.7.1.2. Releases

The local releases to the environment are reported in the following table.

Table 69. Local releases to the environment

Release	Release factor estimation method	Explanation / Justification
Water	ERC based	Initial release factor: 0.005% Final release factor: 0.005% Local release rate: 0.04 kg/day
Air	Release factor	Initial release factor: 5% Final release factor: 5% Local release rate: 40 kg/day Explanation / Justification: Treat air emission to provide a typical removal efficiency of 95%
Soil	ERC based	Final release factor: 0.025%

9.7.1.3. Exposure and risks for the environment and man via the environment

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

Table 70. Exposure concentrations and risks for the environment

Protection target	Exposure concentration	Risk characterisation
Freshwater	Local PEC: 0.002 mg/L	RCR = 0.261
Sediment (freshwater)	Local PEC: 0.017 mg/kg dw	RCR = 0.261
Marine water	Local PEC: 2.148E-4 mg/L	RCR = 0.262
Sediment (marine water)	Local PEC: 0.002 mg/kg dw	RCR = 0.262
Sewage treatment plant	Local PEC: 0.02 mg/L	RCR < 0.01
Agricultural soil	Local PEC: 0.005 mg/kg dw	RCR = 0.622
Man via Environment - Inhalation	Local PEC: 0.003 mg/m ³	RCR < 0.01
Man via Environment - Oral	Exposure via food consumption: 0.002 mg/kg bw/day	RCR = 0.015
Man via environment - combined routes		RCR = 0.02

Table 71. Contribution to oral intake for man via the environment from local contribution

Type of food	Estimated daily dose	Concentration in food
Drinking water	1.453E-4 mg/kg bw/day	0.005 mg/L
Fish	1.627E-6 mg/kg bw/day	9.905E-4 mg/kg ww
Leaf crops	0.002 mg/kg bw/day	0.106 mg/kg ww
Root crops	2.709E-5 mg/kg bw/day	0.005 mg/kg ww
Meat	2.667E-8 mg/kg bw/day	6.202E-6 mg/kg ww
Milk	4.97E-7 mg/kg bw/day	6.202E-5 mg/kg ww

9.7.2. Worker contributing scenario 1: General exposure (closed system) (PROC 1)

9.7.2.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	

	Method
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Closed system (minimal contact during routine operations)	TRA Worker
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: No [Effectiveness Dermal: 0%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.7.2.2. Exposure and risks for workers

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

Table 72. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.01
Inhalation, systemic, acute	0.149 mg/m³ (TRA Worker)	RCR < 0.01
Inhalation, local, long-term	0.037 mg/m³ (TRA Worker)	RCR = 0.013
Inhalation, local, acute	0.149 mg/m³ (TRA Worker)	RCR = 0.017
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.131
Combined routes, systemic, long-term		RCR = 0.141
Combined routes, systemic, acute		RCR < 0.01

Conclusion on risk characterisation

Risk is controlled

9.7.3. Worker contributing scenario 2: General exposure (closed system) with sample collection (PROC 2)

9.7.3.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker

	Method
• Containment: Closed continuous process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.7.3.2. Exposure and risks for workers

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

Table 73. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.153
Inhalation, systemic, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.049
Inhalation, local, long-term	0.557 mg/m³ (TRA Worker)	RCR = 0.191
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.068 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.416
Combined routes, systemic, acute		RCR = 0.049

Conclusion on risk characterisation

Risk is controlled

9.7.4. Worker contributing scenario 3: General exposure (closed system) - batch- with sample collection (PROC 3)

9.7.4.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Closed batch process with occasional controlled exposure	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.7.4.2. Exposure and risks for workers

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

Table 74. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.133
Combined routes, systemic, long-term		RCR = 0.438
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled

9.7.5. Worker contributing scenario 4: General exposure (open system)- batch- with sample collection (PROC 4)

9.7.5.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker

	Method
<i>Provide extract ventilation to points where emissions occur</i>	
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.7.5.2. Exposure and risks for workers

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

Table 75. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.61
Inhalation, systemic, acute	8.914 mg/m³ (TRA Worker)	RCR = 0.196
Inhalation, local, long-term	2.228 mg/m³ (TRA Worker)	RCR = 0.763
Inhalation, local, acute	0.8914 mg/m³ (TRA Worker)	RCR = 0.101
Dermal, systemic, long-term	0.034 mg/kg bw/day (TRA Worker)	RCR = 0.132
Combined routes, systemic, long-term		RCR = 0.742
Combined routes, systemic, acute		RCR = 0.196

Conclusion on risk characterisation

Risk is controlled

9.7.6. Worker contributing scenario 5: Calendering (PROC 6)

9.7.6.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.7.6.2. Exposure and risks for workers

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

Table 76. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.049 mg/kg bw/day (TRA Worker)	RCR = 0.19
Combined routes, systemic, long-term		RCR = 0.739
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.7.7. Worker contributing scenario 6: Spraying (PROC 7)

9.7.7.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Use an extract ventilation to minimize exposure</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm ²)	TRA Worker

9.7.7.2. Exposure and risks for workers

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

Table 77. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.501 mg/m³ (TRA Worker)	RCR = 0.137
Inhalation, systemic, acute	3.343 mg/m³ (TRA Worker)	RCR = 0.073
Inhalation, local, long-term	0.501 mg/m³ (TRA Worker)	RCR = 0.172
Inhalation, local, acute	3.343 mg/m³ (TRA Worker)	RCR = 0.382
Dermal, systemic, long-term	0.039 mg/kg bw/day (TRA Worker)	RCR = 0.148
Combined routes, systemic, long-term		RCR = 0.286
Combined routes, systemic, acute		RCR = 0.073

Conclusion on risk characterisation

Risk is controlled

9.7.8. Worker contributing scenario 7: Bulk transfert non dedicated activities (PROC 8a)

9.7.8.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Good general ventilation (3-5 air changes per hour)	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%]	TRA Worker

	Method
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Respiratory Protection: Yes (Respirator with APF of 20) [Effectiveness Inhal: 95%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.7.8.2. Exposure and risks for workers

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

Table 78. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.107
Inhalation, systemic, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.057
Inhalation, local, long-term	0.39 mg/m³ (TRA Worker)	RCR = 0.134
Inhalation, local, acute	2.6 mg/m³ (TRA Worker)	RCR = 0.297
Dermal, systemic, long-term	0.082 mg/kg bw/day (TRA Worker)	RCR = 0.316
Combined routes, systemic, long-term		RCR = 0.423
Combined routes, systemic, acute		RCR = 0.057

Conclusion on risk characterisation

Risk is controlled

9.7.9. Worker contributing scenario 8: Bulk transfert dedicated facilities (PROC 8b)

9.7.9.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 95%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 95%]	TRA Worker

	Method
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands (960 cm ²)	TRA Worker

9.7.9.2. Exposure and risks for workers

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

Table 79. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	0.928 mg/m³ (TRA Worker)	RCR = 0.254
Inhalation, systemic, acute	18.57 mg/m³ (TRA Worker)	RCR = 0.407
Inhalation, local, long-term	0.928 mg/m³ (TRA Worker)	RCR = 0.318
Inhalation, local, acute	1.857 mg/m³ (TRA Worker)	RCR = 0.212
Dermal, systemic, long-term	0.014 mg/kg bw/day (TRA Worker)	RCR = 0.053
Combined routes, systemic, long-term		RCR = 0.307
Combined routes, systemic, acute		RCR = 0.407

Conclusion on risk characterisation

Risk is controlled

9.7.10. Worker contributing scenario 8: Small package filling (PROC 9)

9.7.10.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 1 hour <i>Avoid carrying out activities involving exposure for more than 1 hour</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: Semi-closed process with occasional controlled exposure	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker

	Method
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.7.10.2. Exposure and risks for workers

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

Table 80. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	22.28 mg/m³ (TRA Worker)	RCR = 0.489
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	2.228 mg/m³ (TRA Worker)	RCR = 0.254
Dermal, systemic, long-term	0.069 mg/kg bw/day (TRA Worker)	RCR = 0.264
Combined routes, systemic, long-term		RCR = 0.569
Combined routes, systemic, acute		RCR = 0.489

Conclusion on risk characterisation

Risk is controlled

9.7.11. Worker contributing scenario 10: Treatment of articles (PROC 13)

9.7.11.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker

	Method
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.7.11.2. Exposure and risks for workers

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

Table 81. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.025 mg/kg bw/day (TRA Worker)	RCR = 0.095
Combined routes, systemic, long-term		RCR = 0.644
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.7.12. Worker contributing scenario 11: Production of preparation or articles (PROC 14)

9.7.12.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: 5-25% <i>Limit the substance content in the product to 25 %</i>	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 4 hours <i>Avoid carrying out activities involving exposure for more than 4 hours</i>	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Provide extract ventilation to points where emissions occur</i>	TRA Worker
• Local exhaust ventilation (for dermal): yes [Effectiveness Dermal: 90%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Short term/high peak exposure: Respiratory Protection: Yes (Respirator with APF of 10) [Effectiveness Inhal: 90%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: Two hands face (480 cm ²)	TRA Worker

9.7.12.2. Exposure and risks for workers

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

Table 82. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.55
Inhalation, systemic, acute	13.37 mg/m³ (TRA Worker)	RCR = 0.293
Inhalation, local, long-term	2.006 mg/m³ (TRA Worker)	RCR = 0.687
Inhalation, local, acute	1.337 mg/m³ (TRA Worker)	RCR = 0.152
Dermal, systemic, long-term	0.006 mg/kg bw/day (TRA Worker)	RCR = 0.024
Combined routes, systemic, long-term		RCR = 0.573
Combined routes, systemic, acute		RCR = 0.293

Conclusion on risk characterisation

Risk is controlled

9.7.13. Worker contributing scenario 12: Laboratory activities (PROC 15)

9.7.13.1. Conditions of use

	Method
Product (article) characteristics	
• Concentration of substance in mixture: Substance as such	TRA Worker
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: < 8 hours	TRA Worker
Technical and organisational conditions and measures	
• General ventilation: Enhanced general ventilation (5-10 air changes per hour) <i>Provide enhanced general ventilation by mechanical means</i>	TRA Worker
• Containment: No	TRA Worker

	Method
• Local exhaust ventilation: yes [Effectiveness Inhal: 90%] <i>Handle in a fume cupboard or under extract ventilation</i>	TRA Worker
• Local exhaust ventilation (for dermal): no [Effectiveness Dermal: 0%]	TRA Worker
• Occupational Health and Safety Management System: Advanced	TRA Worker
Conditions and measures related to personal protection, hygiene and health evaluation	
• Dermal Protection: Yes (chemically resistant gloves conforming to EN374 with specific activity training) [Effectiveness Dermal: 95%]	TRA Worker
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Worker
Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Worker
• Process temperature (for liquid): <= 40 °C	TRA Worker
• Skin surface potentially exposed: One hand face only (240 cm ²)	TRA Worker

9.7.13.2. Exposure and risks for workers

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

Table 83. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.305
Inhalation, systemic, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.098
Inhalation, local, long-term	1.114 mg/m³ (TRA Worker)	RCR = 0.382
Inhalation, local, acute	4.457 mg/m³ (TRA Worker)	RCR = 0.509
Dermal, systemic, long-term	0.017 mg/kg bw/day (TRA Worker)	RCR = 0.065
Combined routes, systemic, long-term		RCR = 0.371
Combined routes, systemic, acute		RCR = 0.098

Conclusion on risk characterisation

Risk is controlled