9.5. Exposure scenario 5: Use at industrial sites - Use as intermediate - industrial

Sector of use: SU 8: Manufacture of bulk, large scale chemicals (including petroleum products); SU 9: Manufacture of fine chemicals; SU 24: Scientific research and development

Environment contributing scenario(s):		
CS 1	Use as intermediate - industrial with STP	ERC 6a
CS 2	Use as intermediate - industrial with direct discharge	ERC 6a
Worker contributing scenario(s):		
CS 3	Process in fully contained system (PROC 1)	PROC 1
CS 4	Closed batch process (PROC 3)	PROC 3
CS 5	Open or semi-closed reaction process (PROC 4)	PROC 4
CS 6	Mixing or blending in batch process (PROC 5)	PROC 5
CS 7	Transfer of substance (charging/discharging) at non-dedicated facilities (PROC 8a)	PROC 8a
CS 8	Transfer of substance (charging/discharging) at dedicated facilities (PROC 8b)	PROC 8b
CS 9	Wet cleaning (PROC 8a)	PROC 8a
CS 10	Handling of solid inorganic substances at ambient temperature (PROC 26)	PROC 26
CS 11	Filling/handling/transfer of solutions (PROC 8b)	PROC 8b
CS 12	Transfer of substance into small containers (including weighing) (PROC 9)	PROC 9
CS 13	Small scale handling/transfer of solutions (PROC 9)	PROC 9
CS 14	Use as laboratory reagent (PROC 15)	PROC 15
CS 15	Laboratory analyses (PROC 15)	PROC 15
CS 16	Vacuum cleaning (PROC 26)	PROC 26

9.5.1. Env CS 1: Use as intermediate - industrial with STP (ERC 6a)

9.5.1.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use amount at site: <= 0.148 tonnes/day
• Annual use amount at site: <= 48.73 tonnes/year
Conditions and measures related to biological sewage treatment plant
• Biological STP: Site specific [Effectiveness Water: 46%]
• Discharge rate of STP: >= 9.36E3 m3/day *10th percentile of measured data*
• Application of the STP sludge on agricultural soil: No
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) *Hazardous wastes from onsite risk management measures and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste. Releases to the floor, water and soil are to be prevented. If the ruthenium content of the waste is elevated enough, internal or external recovery/recycling should be considered.* *Fraction of daily/annual use expected in waste: 0%* *Appropriate waste codes: 06 04 05*, 06 05 02*, 10 08 09, 10 08 11, 10 08 16, 10 08 18, 15 02 02*, 16 08 03, 16 08 06*, 16 08 07*, 19 08 06*, 20 01 40*

Suitable disposal: Hazardous waste produced during the manufacture and downstream use is sent to a recycler only marginal amounts are sent to a landfill or an incinerator. Waste containing ruthenium is recycled for almost a 100% *A detailed assessment has been performed and is reported in the Waste report (ARCHE, 2017)*
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 4.59E5 m3/day

Fate (release percentage) in the biological sewage treatment plant

The biological STP is site specific and the releases to the various compartments have been set by the assessor. They are distributed in the following way:

Release to water	54%
Release to air	0%
Release to sludge	46%
Release degraded	0%

Explanation:
Data from an STP monitoring program conducted at three STPs in Europe (1 in the UK, 2 in Germany)

9.5.1.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

Table 9.48. Local releases to the environment

Release	Release estimation method	Explanations
Water	Estimated release factor (10 % of SpERC)	**Release factor before on site RMM:** 4E-3% **Release factor after on site RMM:** 4E-3% **Local release rate:** 5.91E-3 kg/day
Air	Estimated release factor (SpERC)	**Release factor before on site RMM:** 0.03% **Release factor after on site RMM:** 0.03% **Local release rate:** 0.044 kg/day
Non agricultural soil	ERC	**Release factor after on site RMM:** 0.1%

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. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

Table 9.49. Exposure concentrations and risks for the environment and man via the environment

Protection target	Exposure concentration	Risk quantification
Fresh water	**Local PEC:** 5.16E-6 mg/L	RCR = 0.021
Sediment (freshwater)	**Local PEC:** 0.163 mg/kg dw	RCR = 0.021
Marine water	**Local PEC:** 2.38E-6 mg/L	RCR = 0.097
Sediment (marine water)	**Local PEC:** 0.075 mg/kg dw	RCR = 0.099
Sewage Treatment Plant	**Local PEC:** 3.41E-4 mg/L	RCR < 0.01
Agricultural soil	**Local PEC:** 0.012 mg/kg dw	RCR < 0.01

9.5.2. Env CS 2: Use as intermediate - industrial with direct discharge (ERC 6a)

9.5.2.1. Conditions of use

Amount used, frequency and duration of use (or from service life)
• Daily use amount at site: <= 0.148 tonnes/day
• Annual use amount at site: <= 48.73 tonnes/year
Conditions and measures related to biological sewage treatment plant
• Biological STP: None [Effectiveness Water: 0%]
Conditions and measures related to external treatment of waste (including article waste)
• Particular considerations on the waste treatment operations: No (low risk) *Hazardous wastes from onsite risk management measures and solid or liquid wastes from production, use and cleaning processes should be disposed of separately to hazardous waste incineration plants or hazardous waste landfills as hazardous waste. Releases to the floor, water and soil are to be prevented. If the ruthenium content of the waste is elevated enough, internal or external recovery/recycling should be considered.* *Fraction of daily/annual use expected in waste: 0%* *Appropriate waste codes: 06 04 05*, 06 05 02*, 10 08 09, 10 08 11, 10 08 16, 10 08 18, 15 02 02*, 16 08 03, 16 08 06*, 16 08 07*, 19 08 06*, 20 01 40* *Suitable disposal: Hazardous waste produced during the manufacture and downstream use is sent to a recycler only marginal amounts are sent to a landfill or an incinerator. Waste containing ruthenium is recycled for almost a 100%* *A detailed assessment has been performed and is reported in the Waste report (ARCHE, 2017)*
Other conditions affecting environmental exposure
• Receiving surface water flow rate: >= 3E6 m3/day
• Discharge rate of effluent: >= 3E3 m3/day

9.5.2.2. Releases

The local releases to the environment are reported in the following table. Note that the releases reported do not account for the removal in the modelled biological STP.

Table 9.50. Local releases to the environment

Release	Release estimation method	Explanations
Water	Estimated release factor (10 % of SpERC)	**Release factor before on site RMM:** 4E-3% **Release factor after on site RMM:** 4E-3% **Local release rate:** 5.91E-3 kg/day
Air	Estimated release factor (SpERC)	**Release factor before on site RMM:** 0.03% **Release factor after on site RMM:** 0.03% **Local release rate:** 0.044 kg/day
Non agricultural soil	ERC	**Release factor after on site RMM:** 0.1%

9.5.2.3. 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. The exposure estimates have been obtained with EUSES 2.1.2 unless stated otherwise.

Table 9.51. Exposure concentrations and risks for the environment and man via the environment

Protection target	Exposure concentration	Risk quantification
Fresh water	**Local PEC:** 1.87E-6 mg/L	RCR < 0.01
Sediment (freshwater)	**Local PEC:** 0.059 mg/kg dw	RCR < 0.01
Agricultural soil	**Local PEC:** 0.012 mg/kg dw	RCR < 0.01

9.5.3. Worker CS 3: Process in fully contained system (PROC 1) (PROC 1)

9.5.3.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Maximum process temperature: 70 °C	
• Level of containment: Closed process	
• Dermal pattern of use: Closed system without breaches	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: None	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.3.2. Exposure and risks for workers

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

Table 9.52. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	10 µg/m³ (MEASE 1.02.01)	RCR = 0.026
Dermal, systemic, long term	0.17 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.027

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.4. Worker CS 4: Closed batch process (PROC 3) (PROC 3)

9.5.4.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Level of containment: Closed process	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Intermittent	
• Generic local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 78%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.4.2. Exposure and risks for workers

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

Table 9.53. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.22 mg/m³ (MEASE 1.02.01)	RCR = 0.579
Dermal, systemic, long term	0.17 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.58

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.5. Worker CS 5: Open or semi-closed reaction process (PROC 4) (PROC 4)

9.5.5.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid, powder / dust	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece*	

	Method
according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.5.2. Exposure and risks for workers

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

Table 9.54. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.2 mg/m³ (MEASE 1.02.01)	RCR = 0.526
Dermal, systemic, long term	0.34 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.528

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.6. Worker CS 6: Mixing or blending in batch process (PROC 5) (PROC 5)

9.5.6.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Intermittent	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.6.2. Exposure and risks for workers

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

Table 9.55. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.2 mg/m³ (MEASE 1.02.01)	RCR = 0.526
Dermal, systemic, long term	0.34 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.528

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs

(RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.7. Worker CS 7: Transfer of substance (charging/discharging) at non-dedicated facilities (PROC 8a) (PROC 8a)

Transfer of solid substance at non-dedicated facilities

9.5.7.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: 60 - 240 min [Effectiveness Inhalation: 40%, Dermal: 40%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Extensive	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.7.2. Exposure and risks for workers

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

Table 9.56. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.24 mg/m³ (MEASE 1.02.01)	RCR = 0.632
Inhalation, local, long term	0.24 mg/m³ (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	41 µg/kg bw/day (MEASE 1.02.01)	RCR = 0.152
Dermal, local, long term	3 µg/cm² (MEASE 1.02.01)	Qualitative risk
Dermal, local, acute	3 µg/cm² (MEASE 1.02.01)	Qualitative risk
Combined routes, systemic, long-term		RCR = 0.783

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.8. Worker CS 8: Transfer of substance (charging/discharging) at dedicated facilities (PROC 8b) (PROC 8b)

Transfer of solid substance at dedicated facilities

9.5.8.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Intermittent	

	Method
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.8.2. Exposure and risks for workers

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

Table 9.57. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.2 mg/m³ (MEASE 1.02.01)	RCR = 0.526
Inhalation, local, long term	0.2 mg/m³ (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	0.34 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Dermal, local, long term	0.05 µg/cm² (MEASE 1.02.01)	Qualitative risk
Dermal, local, acute	0.05 µg/cm² (MEASE 1.02.01)	Qualitative risk
Combined routes, systemic, long-term		RCR = 0.528

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.9. Worker CS 9: Wet cleaning (PROC 8a) (PROC 8a)

9.5.9.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solution	
• Maximum emission potential of the substance: Very low *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Extensive	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.9.2. Exposure and risks for workers

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

Table 9.58. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	50 µg/m³ (MEASE 1.02.01)	RCR = 0.132
Dermal, systemic, long term	34 µg/kg bw/day (MEASE 1.02.01)	RCR = 0.126
Combined routes, systemic, long-term		RCR = 0.258

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term,

Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.10. Worker CS 10: Handling of solid inorganic substances at ambient temperature (PROC 26) (PROC 26)

Handling of solid inorganic substances at ambient temperatures

9.5.10.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid, powder / dust	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Extensive	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.10.2. Exposure and risks for workers

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

Table 9.59. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.08 mg/m³ (MEASE 1.02.01)	RCR = 0.211
Inhalation, local, long term	0.08 mg/m³ (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	1.4 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Dermal, local, long term	0.05 µg/cm² (MEASE 1.02.01)	Qualitative risk
Dermal, local, acute	0.05 µg/cm² (MEASE 1.02.01)	Qualitative risk
Combined routes, systemic, long-term		RCR = 0.216

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.11. Worker CS 11: Filling/handling/transfer of solutions (PROC 8b) (PROC 8b)

9.5.11.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solution	
• Maximum emission potential of the substance: Very low *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally,*	

	Method
face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.11.2. Exposure and risks for workers

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

Table 9.60. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	10 µg/m³ (MEASE 1.02.01)	RCR = 0.026
Dermal, systemic, long term	0.34 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.028

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.12. Worker CS 12: Transfer of substance into small containers (including weighing) (PROC 9) (PROC 9)

Transfer of solid substance (including weighing)

9.5.12.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	

	Method
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 10 [Effectiveness Inhalation: 90%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P2 with mask according to EN 140, EN 1827 or EN 136 or filtering half mask (FF P2) according to EN 149 or combination of P1 filter with face piece according EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.12.2. Exposure and risks for workers

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

Table 9.61. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.32 mg/m³ (MEASE 1.02.01)	RCR = 0.842
Inhalation, local, long term	0.32 mg/m³ (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	3.4 µg/kg bw/day (MEASE 1.02.01)	RCR = 0.013
Dermal, local, long term	0.5 µg/cm² (MEASE 1.02.01)	Qualitative risk
Dermal, local, acute	0.5 µg/cm² (MEASE 1.02.01)	Qualitative risk
Combined routes, systemic, long-term		RCR = 0.855

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in

MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.13. Worker CS 13: Small scale handling/transfer of solutions (PROC 9) (PROC 9)

9.5.13.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solution	
• Maximum emission potential of the substance: Very low *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.13.2. Exposure and risks for workers

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

Table 9.62. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	10 µg/m³ (MEASE 1.02.01)	RCR = 0.026
Dermal, systemic, long term	3.4 µg/kg bw/day (MEASE 1.02.01)	RCR = 0.013
Combined routes, systemic, long-term		RCR = 0.039

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.14. Worker CS 14: Use as laboratory reagent (PROC 15) (PROC 15)

Use of solid as laboratory reagent

9.5.14.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiency* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 10 [Effectiveness Inhalation: 90%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P2 with mask according to EN 140, EN 1827 or EN 136 or filtering half mask (FF P2) according to EN 149 or combination of P1 filter with face piece according EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	

	Method
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.14.2. Exposure and risks for workers

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

Table 9.63. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.08 mg/m³ (MEASE 1.02.01)	RCR = 0.211
Inhalation, local, long term	0.08 mg/m³ (MEASE 1.02.01)	Qualitative risk
Dermal, systemic, long term	1.7 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Dermal, local, long term	0.5 µg/cm² (MEASE 1.02.01)	Qualitative risk
Dermal, local, acute	0.5 µg/cm² (MEASE 1.02.01)	Qualitative risk
Combined routes, systemic, long-term		RCR = 0.217

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.15. Worker CS 15: Laboratory analyses (PROC 15) (PROC 15)

9.5.15.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solution	
• Maximum emission potential of the substance: Very low *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	

	Method
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Direct handling	
• Dermal contact level: Intermittent	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	
• Respiratory protective equipment (RPE) as precautionary measure: *RPE protecting from local effects via inhalation (moderate hazard). (Due to potential adverse effects of the substance to the respiratory tract, RPE (minimum assigned protection factor of 10) is prescribed on a precautionary basis for all workplaces unless inhalation exposure to the substance can be excluded.)*	

9.5.15.2. Exposure and risks for workers

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

Table 9.64. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	10 µg/m³ (MEASE 1.02.01)	RCR = 0.026
Dermal, systemic, long term	1.7 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01
Combined routes, systemic, long-term		RCR = 0.033

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.

9.5.16. Worker CS 16: Vacuum cleaning (PROC 26) (PROC 26)

9.5.16.1. Conditions of use

	Method
Product (article) characteristics	
• Physical form of substance: Solid, powder / dust	
• Maximum emission potential of the substance: High *Only the highest emission potential (EP) is reported. Lower EPs (e.g. if materials of lower dustiness are being handled in parallel) are thus automatically covered in this assessment.*	
• Content in preparation: Not restricted [Effectiveness Inhalation: 0%, Dermal: 0%]	
Amount used (or contained in articles), frequency and duration of use/exposure	
• Maximum duration of exposure: > 240 min (not restricted) [Effectiveness Inhalation: 0%, Dermal: 0%]	
Technical and organisational conditions and measures	
• Integrated local exhaust ventilation: Lower confidence limit (industrial use) [Effectiveness Inhalation: 84%] *Standard efficiencySurrogate exposure determinant used to reflect the efficiency of a vacuum cleaner.* Inhalation explanation: *Efficiency for industrial use*	
• Dermal pattern of use: Non-dispersive use	
• Dermal pattern of exposure control: Non-direct handling	
• Dermal contact level: Extensive	
• Additional operational conditions for cleaning: No direct manual removal of dust.	
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protective equipment (RPE): RPE with minimum APF = 20 [Effectiveness Inhalation: 95%] *APF = assigned protection factor according to EN 529. At minimum any combination of particle filter class P3 with mask according to EN 140, EN 1827 or filtering half mask (FF P3) according to EN 149 or combination of P2 filter with face piece according to EN 12941 or EN 12942 or any RPE providing higher APFs according to EN 529 is required.*	
• Gloves/face protection: *Due to the potential adverse effects of the substance to skin (moderate hazard), protective gloves according to EN 374 have to be worn at all workplaces. Additionally, face protection is required to be worn as appropriate. Gloves have to be changed according to manufacturer's information or when damaged, whatever is the earlier. [Effectiveness Dermal: 90%]*	
• Eye protection: *Eye protection to be worn to protect from adverse effects to the eyes (moderate hazard). (Due to the adverse effects of the substance to the eyes, direct contact of the eyes with the substance is to be avoided including hand to eye transfer after touching contaminated surfaces. Suitable eye protection equipment (e.g. goggles or visors) must be worn.)*	

9.5.16.2. Exposure and risks for workers

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

Table 9.65. Exposure concentrations and risks for workers

Route of exposure and type of effects	Exposure concentration	Risk quantification
Inhalation, systemic, long term	0.08 mg/m³ (MEASE 1.02.01)	RCR = 0.211
Dermal, systemic, long term	1.4 µg/kg bw/day (MEASE 1.02.01)	RCR < 0.01

Route of exposure and type of effects	Exposure concentration	Risk quantification
Combined routes, systemic, long-term		RCR = 0.216

Remarks on exposure data from external estimation tools:

MEASE 1.02.01:
Explanation: For calculation of systemic exposure, the exposure estimate for total dermal loading as obtained in MEASE (reported in mg/day) is divided by a body weight of 70 kg for workers.

Risk characterisation

Qualitative risk characterisation (Inhalation, local, long term, Inhalation, local, acute, Dermal, local, long term, Dermal, local, acute, Eye, local):
Under the prescribed conditions of use, quantitative estimated exposures are below the respective DNELs (RCRs < 1).
Further information on the risk characterisation for local effects via inhalation, for local dermal effects and local effects to the eyes is given in Section 9.0.2.3.
On this basis, systemic and local risks are considered to be adequately controlled.