SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

- Trade name: **C10 FRACTION NON-HYDROGENATED**
- Chemical name: Distillates (petroleum), cracked, ethylene manuf. by-product, C9-10 fraction
- Registration number REACH: 01-2119487291-35-0001
- UFI code: irrelevant for substances
- Index number: Substance is not in the list of harmonized classifications (Annex VI of CLP)
- CAS number: 94733-07-0
- EC number: 305-586-4

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.2.1. Identified uses

Monomer for the industrial production of hydrocarbon resin.

1.2.2. Non-recommended uses

There are no non-recommended uses stated in the registration. The product may not be used in any way other than that specified in point 1.2.1 or subsection 7.3.

1.3. Details of the supplier of the safety data sheet

producer: ORLEN Unipetrol RPA s.r.o. Záluží 1, 436 70 Litvínov, Czech Republic

ID No.: 27597075
☎: +420 476 161 111
fax: +420 476 709 553
info@orlenunipetrol.cz
www.orlenunipetrolrpa.cz

Other contacts:

- Director of the Monomers and Chemicals Unit: ☎: +48 242 566 615, email: Dorota.Smolarek@orlen.pl
- Key Account Manager: ☎: +420 226 841 474, email: Beata.Zajicova@orlenunipetrol.cz
- Head of Customer Service Department: ☎: +420 476 162 006, email: Lucie.Markova@orlenunipetrol.cz
- Person professionally qualified to compile a SDS: email: reach.unirpa@orlenunipetrol.cz

1.4. Emergency telephone number

- ORLEN Unipetrol RPA s.r.o. ☎:+420 476 163 111 (NON STOP)
- Toxicological Information Center (TIS) ☎:+420 224 919 293 (NON STOP)
  Na bojišti 1, 120 00 Prague 2, Czech Republic ☎:+420 224 915 402 (NON STOP)
  e-mail: tis@vfn.cz
- Transport Information & Accident System (TRINS) ☎:+420 476 163 111 (NON STOP)

Note: Emergency telephone numbers for EU countries are listed in section 16.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

The product is classified as hazardous pursuant to CLP Regulation (EC) No. 1272/2008 CLP:

FLAMMABLE LIQUID, CATEGORY 3	**Flam. Liq. 3, H 226**
ACUTE TOXICITY, CATEGORY 4 (ORAL)	**Acute Tox. 4, H 302**
ACUTE TOXICITY, CATEGORY 4 (INHAL)	**Acute Tox. 4, H 332**
CARCINOGENIC, CATEGORY 1A	**Carc. 1A, H 350**
MUTAGENIC, CATEGORY 1B	**Muta. 1B, H 340**

ASPIRATION HAZARD, CATEGORY 1	**Asp. Tox. 1, H 304**
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPLOSURE), CATEGORY 3 (AFFECTED ORGANS: RESPIRATORY SYSTEM, LUNGS)	**STOT SE 3, H 335**
SERIOUS EYE DAMAGE / EYE IRRITATION, CATEGORY 2	**Eye Irrit. 2, H 319**
SKIN CORROSION/IRRITATION, CATEGORY 2	**Skin Irrit. 2, H 315**
HAZARDS TO THE AQUATIC ENVIRONMENT (ACUTE/SHORT-TERM), CATEGORY 1	**Aquatic Acute 1, H 400**
HAZARDS TO THE AQUATIC ENVIRONMENT (CHRONIC/LONG-TERM, CATEGORY CHRONIC 2	**Aquatic Chronic 1, H 410**

Note: The full text of the H-sentence and / or EUH-sentences is stated in Section 16.

2.2. Label elements

Product identifiers		**C10 FRACTION NON-HYDROGENATED** DISTILLATES (PETROLEUM), CRACKED, ETHYLENE MANUF. BY-PRODUCT, C9-10 FRACTION CAS number.: 94733-07-0
Warning hazard symbol		
Signal word		**DANGER**
H-phrases (standard hazard phrases)	H226 H302 H304 H315 H319 H332 H335 H340 H350 H410	Flammable liquid and vapour. Harmful if swallowed. May be fatal if swallowed and enters airways. Causes skin irritation. Causes serious eye irritation. Harmful if inhaled. May cause respiratory irritation. May cause genetic defects. May cause cancer. Very toxic to aquatic life with long lasting effects.
P-statements (precautionary statements)	P201 P210 P243 P261 P271 P273 P280 P301+P310 P302+P352 P305+P351+P338 P308+P313 P331 P391 P403+P235	Obtain special instructions before use. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take action to prevent static discharges. Avoid breathing fume/vapours/spray. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection. IF SWALLOWED: Immediately call a POISON CENTER/doctor. IF ON SKIN: Wash with plenty of water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Get medical advice/attention. DO NOT INDUCE vomiting. Collect spillage. Store in a well-ventilated place. Keep cool.
Additional information		Only for professional users.

ORLEN Unipetrol RPA s.r.o.
Záluží 1, 436 70 Litvínov, Czech Republic
☎: +420 476 161 111

2.3. Other hazards

Vapours with oxygen create explosive mixtures that are heavier than air, and so they amass and spread near the ground, and in case of a random leak may initiate a fire or explosion even far from the source. The product does not dissolve in water, it floats on and above the water surface and thus explosive mixtures with air may be created. There is a danger of explosion and subsequent fire if the product leaks in the sewage.
The product is classified as hazardous if inhaled. This means that in case of consumption and subsequent vomiting, there is a risk of aspiration (entering the lungs) and a risk of chemical pneumonia (lung swelling), which may lead to death.
Product is not identified as a PBT substance (Persistent, Bioaccumulative, Toxic) or a vPvB (very Persistent, very Bioaccumulative) substance. Product assessments for PBT / vPvB criteria see Subsection 12.5. ("Results of PBT and vPvB assessment").
Based on the available information, the product is not identified as a PMT substance (P-persistent, M-mobile, T-toxic) or as a vPvM substance (vP-very persistent, vM-very mobile).
The substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

Name of the substance:	C10 FRACTION NON-HYDROGENATED	
Index number (index):	none	
CAS number:	94733-07-0	
EC number:	305-586-4	
this UVCB substance contains the following components • *in a concentration of ≥10% or* • *influencing the classification of this substance:*	*NAME:*	*IDENTIFIER:*
	benzene	*benzene (index 601-020-00-8, CAS 71-43-2, ES 200-753-7)*
	ethylbenzene	*ethylbenzene (index 601-023-00-4, CAS 100-41-4, ES 202-849-4)*
	xylenes	*xylene (index 601-022-00-9, CAS 1330-20-7, ES 215-535-7)*
	naphthalene	*naphthalene (index 601-052-00-2, CAS 91-20-3, ES 202-049-5)*
	indene	*indene (CAS 95-13-6, ES 202-393-6)*
	methylstyrenes	*methylstyrenes (CAS 25013-15-4, ES 246-562-2)*
	methylindenes	*2-methylindene (CAS 2177-47-1)*
	1,2-dihydronaphthtalene	*1,2-dihydronahthalene (CAS 447-53-0, ES 207-183-8)*
	tetrahydronaphthalene	*1,2,3,4-tetrahydrnaphthalehe (index 601-045-00-4, CAS 119-64-2, ES 204-340-2)*

Note1: The UVCB substance does not contain a nanoform.

Note2:

Harmonized classification: Specific concentration limits (SCL), M-factor (M-) and Acute toxicity estimate (ATE) were not determined for this substance.

Registration documentation: and Acute toxicity estimate (ATE) =LD_{50} stated in the section 11.1.; M-factor (M-) – NOEC a LC_{50} stated in the section 12.1.

3.2. Mixtures

Not applicable, the product is a substance.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

4.1.1. General instructions

When providing first aid, ensure your own safety.
Call the emergency medical services (☎112 EU) and follow their instructions until they arrive.
Provision of first aid must always focus on checking for consciousness, breathing, and blood circulation. In case of loss of consciousness and breathing, check if the airway is clear (pull out the lower jaw slightly). If the airway is clear, immediately start CPR (chest compressions) and artificial respiration in a 30:2 ratio. It is also possible to perform only chest COMPRESSIONS without artificial respiration if you are not trained or if for reasons of personal safety you are unwilling to perform artificial respiration.
If the subject is unconscious and breathing NORMALLY (REGULARLY), place them in the recovery position. When in doubt, if you are not sure if the person is breathing (for example, there is a long pause between breaths), act as if the person were not breathing.
If the person is unconscious or has spasms, do not administer anything by mouth, just place the person in the recovery position.
A patient's condition can improve very quickly, so never take your eyes off the patient and keep checking on consciousness and breathing.

4.1.2. When inhaled

Transport the patient to fresh air, do not let them get cold and ensure specialized medical help.

4.1.3. Skin contact

Remove contaminated clothing and shoes. Thoroughly wash the affected areas with water (ideally tepid) and soap - continue for at least 15 minutes.. If symptoms persist, secure professional medical help.

4.1.4. Contact with eyes

Immediately start washing wide open eyes under flowing tepid water and continue for at least 15 minutes. If the patient has contact lenses, remove them before washing his/her eyes. Avoid direct eye contact with the product, including through contaminated hands. Protect unharmed eye. Secure professional medical help.

4.1.5. When ingested

DO NOT INDUCE VOMITING! If the patient is vomiting on his/her own, keep his/her head below his/her hips to prevent him/her from inhaling his/her own vomit. Secure professional medical help as soon as possible.
Clean mouth with water and drink afterwards plenty of water. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person.

4.2. Most important symptoms and effects, both acute and delayed

Based on the size of exposure, the substance may cause headaches, sore throat, coughing, breathing difficulties, chest pressure, disruptions of the central nervous system, nausea, sleepiness and dizziness. Consumption may lead to abdomen spasms, spontaneous vomiting with a risk of aspiration and of chemical pneumonia, which may cause death. Direct contact with eyes or skin may cause their irritation and cause the affected area to turn red, swell and produce tears. Prolonged exposure of the skin to the substance may lead to ungreasing and crackles.

4.3. Indication of any immediate medical attention and special treatment needed

Immediate medical help is necessary in case of consumption or if the substance enters the lungs. Show the material safety data sheet or label if possible. If a gastric lavage is necessary, it may be performed only by a qualified doctor via endotracheal intubation.
We recommend the workplace to be equipped with a safety shower and a device for washing eyes.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Appropriate extinguishing media: low expansion foam, spray or water fog.
Inappropriate extinguishing media: direct water stream.
Extinguishing small fire: dry-powder or carbon dioxide (CO2) extinguisher, dry sand or extinguishing foam.

5.2. Special hazards arising from the substance or mixture

The vapors are heavier than air. They accumulate and spread near the ground to significant distances and in contact with a source of ignition may cause back-up with subsequent explosion and / or fire. This danger is imminent especially in places below the ground or in enclosed places. Toxic or irritating fuels containing monoxide, carbon dioxide or unburned hydrocarbon (smoke) might be produced during burning.

5.3. Advice for firefighters

Minimize the penetration of extinguishing medium contaminated by the substance into the sewage, surface or underground waters or into the soil. There is a danger of explosion and subsequent fire in case of a leak into the sewage.
Use water spray to keep the containers cool in order to prevent an explosion caused by the heat.
Do not use foam and water at the same time because water dissolves the foam.
Protective equipment for fire fighters: full protective gear and self-contained close-circuit breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Close the accident location and prevent access to the endangered area by persons who do not participate in the liquidation of the given incidental leak. Remain on the windward side. There is a danger of fire in case of accidental release of this substance, therefore remove all possible ignition sources, do not smoke and do not manipulate with open fire. If possible, ensure a sufficient ventilation of enclosed spaces.
Prevent direckt contact with the substance and its vapors. Use proper personal protective equipment (as indicated in Subsection 8.2) when removing the effects of the emergency event/accident. Evacuate people from the whole area in danger for large accidents. There is a danger of vapors explosion in case of substance initiation in places below the ground or in enclosed places (including sewage).

6.2. Environmental precautions

If it safety, prevent further leaking and enclose the leaking place. Prevent leakage of the substance into the sewage, surface and underground waters by covering sewage inlets. Inform the relevant authorities if rivers, lakes or sewage systems have been contaminated during the leak. Do not allow the substance to enter into soil/subsoil. Should the leak contaminate surface water, soil or public sewerage systems, notify the appropriate authorities.

6.3. Methods and material for containment and cleaning up

Safely drain the leaked substance. There is a danger of fire during a leak; therefore only explosion-proof luminaries and electrical equipment and non-sparking tools must be used. Absorb the remains into an appropriate non-flammable porous/absorbent material (e.g. sand, dirt, siliceous earth, vermiculit) and transport for disposal in sealed containers. Dispose of in accordance with valid legal regulations for waste (see Section 13).
For large leaks into water use floating barrage and collect the substance from surface using surface skimmers (separators) or cover the leaked substance with sorbent and remove saturated sorbent from the surface by scraping or draining. Consult a professional before using dispersing agents. The product will flow in water and can flare on its surface.

6.4. Reference to other

For recommended personal protective aids – see Subsection 8.2. (“Exposure controls”).
For recommended manner of removing waste – see Section 13 (“Disposal considerations”).

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Adhere to all fire safety precautions (no smoking, no open fire, removal of all possible combustion sources and oxidizing agents) and stay in well-ventilated areas when manipulating with the substance and with empty tanks (may contain residue).
Do not perform activities such as welding, cutting, grinding etc. near containers (even empty ones). Only open containers where protection against leaks is ensured and appropriate suction.
Keep in mind that the gases of the product are heavier than air, and so perform necessary precautions to prevent their accumulation underground.
Do not use compressed air for emptying, filling or any other handling.
Prevent bolts of static electricity. Use non-sparking tools.
Handle empty containers with care; vapor residues can be flammable.
Cleaning, inspections and maintenance of the inner structure of the storage tanks can be only conducted by properly equipped and qualified personnel.
Please keep the rules of personal hygiene. Take off contaminated pieces of clothing. Do not eat, drink or smoke during work! Wash your hands and exposed parts of body thoroughly with soap and water after work and before meal and possibly treat with suitable reparation lotion. Do not wear contaminated clothing, shoes or protective equipment in the catering area.

7.2 Conditions for safe storage, including any incompatibilities

Storage must adhere to the fire safety requirements on buildings and electric equipment must adhere to valid regulations. Store in cool, well-ventilated places with efficient suction from all heat and combustion sources. Storage containers must be closed, properly labeled and grounded. Recommended material suitable for containers is soft or stainless steel. Do not store near incompatible materials, such as oxidizers (oxygen, air etc.) or other flammable materials. Vapors above the stored liquid can be flammable / explosive if they are not covered with an inert gas.
Open containers must be carefully closed, permanently marked and maintained in a vertical position, thus preventing leaks.

7.3 Specific end use(s)

The substance is intended for specific use as a monomer to which the recommendations given in exposure scenario ES5 (IS) "Use of C10 non-hydrogenated monomer fraction for the industrial manufacture of polymers", which is included in the annex to this Safety Data Sheet.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

8.1.1. Occupational exposure limit values

The following Permissible Exposure Limits (PELs) and Maximum Allowable Concentrations (NPK-P) of Chemicals in the Atmosphere of Workplaces within the Czech Republic are set by the Government Regulation No. 361/2007 Coll., determining conditions of occupational health protection, as amended:

Name	CAS number	PEL [mg.m^{-3}]	NPK-P [mg.m^{-3}]	Note
Distillates (petroleum), cracked, ethylene manuf. by-product, C9-10 fraction	94733-07-0	Limit values for the substance have not been determine. *It is recommended to comply with the limits specified for individual components, present in this substance:*		
Substance components :	*NAME / CAS NUMBER:*	*PEL [mg.m^{-3}]*	*NPK-P [mg.m^{-3}]*	
	benzene / 71-43-2	*1,65 / 0,66**	*10*	*B ; D ; I ; M ; P; K*
	ethylbenzene/100-41-4	*200*	*500*	*B ; D ; P*
	xylenes / 1330-20-7	*200*	*400*	*B ;D; I*

naphthtalene / 91-20-3	*50*	*100*	
DCPD / 77-73-6	*3*	*6*	*I*
styrene / 100-42-5	*100*	*400*	

Note 1: B - a biological exposure test (BET) in urine or blood is introduced for the substance
D - penetration of the factor through the skin is significantly applied during exposure
I - irritates mucous membranes (eyes, respiratory tract) or the skin
M - mutagen in germ cells category 1A and 1B (with sentence H340)
P - serious late effects cannot be ruled out for the substance (with phrase H372, H373)
K - carcinogen category 1A and 1B (with sentence H350, H350i)

Note 2: An explanation of the meaning of the PEL and NPK-P abbreviations is in section 16.
Note 3: Occupational exposure limit values for EU countries are listed in section 16.
*Note *: Limit value of 1.65 mg/m^3 valid until 05.04.2026. Limit value 0.66 mg/m^3 from 05.04.2026.*

Limit values of indicators of biological exposure tests in urine (Annex No. 2 to Decree No. 432/2003 Coll.):

Name	CAS number	Indicator	Limit values	Note
Distillates (petroleum), cracked, ethylene manuf. by-product, C9-10 fraction	94733-07-0	Limit values for the substance have not been determine. *It is recommended to comply with the limits specified for individual components, present in this substance:*		
Substance components :	*NAME / CAS NUMBER:*	*PEL [mg.m^{-3}]*	*NPK-P [mg.m^{-3}]*	
	benzene / 71-43-2	*S-Phenylmercapturic acid, t-Muconic acid*	*0,05 mg/g of creatinine 1.5 mg/g of creatinine*	
	ethylbenzene/ 100-41-4	*Mandelic acid*	*1500 mg/g of creatinine*	
	xylenes / 1330-20-7	*Methylhippuric acid*	*1400 mg/g of creatinine*	
	styrene / 100-42-5	*Mandelic acid Mandelic + phenylglyoxylic acid*	*400 mg/g of creatinine 600 mg/g of creatinine*	

8.1.2. DNEL/DMEL values

Toxicological information – hazard assessment for employees:

Hazard driver Styrene

EXPOSURE OF WORKERS / EMPLOYEES			
EXPOSURE	**IMPACTS**	**POINT OF ENTRY**	**DNEL**
acute	system	skin	no hazard identified
acute	system	inhaling	289 mg/m³
acute	local	skin	no hazard identified
acute	local	inhaling	306 mg/m³
acute	local	eye	no hazard identified
long-term	system	skin	406 mg/kg bw/day
long-term	system	inhaling	85 mg/m³
long-term	local	skin	no hazard identified
long-term	local	inhaling	no hazard identified

Hazard driver DCPD

EXPOSURE OF WORKERS / EMPLOYEES			
EXPOSURE	**IMPACTS**	**POINT OF ENTRY**	**DNEL**
acute	system	skin	no hazard identified
acute	system	inhaling	no hazard identified
acute	local	skin	no hazard identified
acute	local	inhaling	160,23 mg/m³
acute	local	eye	low hazard (no threshold derived)

EXPOSURE OF WORKERS / EMPLOYEES			
EXPOSURE	**IMPACTS**	**POINT OF ENTRY**	**DNEL**
long-term	system	skin	0,3 mg/kg bw/day
long-term	system	inhaling	1058 mg.m^{-3}
long-term	local	skin	no hazard identified
long-term	local	inhaling	2,31 mg/m³

Hazard driver Napthalene

EXPOSURE OF WORKERS / EMPLOYEES			
EXPOSURE	**IMPACTS**	**POINT OF ENTRY**	**DNEL**
acute	system	skin	no hazard identified
acute	system	inhaling	no hazard identified
acute	local	skin	no hazard identified
acute	local	inhaling	no hazard identified
acute	local	eye	no hazard identified
long-term	system	skin	3.57 mg/kg bw/day
long-term	system	inhaling	25 mg.m^{-3}
long-term	local	skin	no hazard identified
long-term	local	inhaling	25 mg/m³

Note 1: The risk and exposure assessment was performed on the basis of the content of selected components so-called hazard drivers (styrene, DCPD, naftalene) and their maximum possible content in the registered substance to cover the composition of all registrants of the substance. The content of styrene in the substance produced by ORLEN Unipetrol RPA is <1%. The content of DCPD in the substance produced by ORLEN Unipetrol RPA is <2%. The content of naftalene in the substance produced by ORLEN Unipetrol RPA is <2%.
Note 2: An explanation of the meaning of the DNEL/DMEL abbreviations is in section 16.

8.1.3. PNEC values

Determination of concrete PNEC values based on experimental data obtained by testing modified water fractions containing dissolved/emulsified/suspended shares of the tested substance (WAF – "Water accommodated Fraction") is not suitable for UVCB substances of the hydrocarbon type. The risk and exposure assessment was performed on the basis of the content of selected components so-called hazard drivers.

Ecotoxicological information_Styrene

Environmental hazard assessment

COMPARTMENT	HAZARD CONCLUSION	REMARKS / JUSTIFICATION
Freshwater	PNEC aqua (freshwater): 0,028 mg/l Intermittent releases: 0,04 mg/l	Assessment factor: 10 Extrapolation method: assessment factor PNEC aqua (freshwater)
Marine water	PNEC aqua (marine water): 0,014mg/l Intermittent releases:	Assessment factor: 20 Extrapolation method: assessment factor PNEC aqua (marine water)
Sediments (freshwater)	PNEC sediment (freshwater): 0,614 mg/kg sediment dw	Extrapolation method: equilibrium partitioning method PNEC sediment (freshwater)
Sediments (marine water)	PNEC sediment (marine water): 0,307 mg/kg sediment dw	Extrapolation method: equilibrium partitioning method; PNEC sediment (marine water)
Sewage treatment plant	PNEC STP: 5 mg/l	Assessment factor: 100 Extrapolation method: assessment factor PNEC STP
Soil	PNEC soil: 0,2 mg/kg soil dw	Extrapolation method: equilibrium partitioning method PNEC soil
Air	no hazard identified	
Secondary poisoning	no potential for bioaccumulation	

8.1.4. Recommended monitoring of the concentration in the workplace
Gas chromatography (GC) with a flame ionizing detector (FID) or a mass spectrometer (MS) in accordance with technical norms ČSN EN 689 and ČSN EN 482.

8.2. Exposure control

8.2.1. Technical protective measures for limiting the exposure of people and the environment
Exposure control of unwanted exposure of humans and the environment must be ensured by strictly keeping the substance under control by using process and control technologies, which reduce emissions and subsequent exposure with the goal of preventing the substance from entering the air and water systems as well as the soil, and of preventing possible human exposure. The areas where the substance is stored and manipulated must be equipped with impermeable floors and retaining tanks in case of emergency leaks.
It is necessary to ensure good ventilation of the space (global as well as local ventilation or efficient suction).

8.2.2. Individual protective measures
If an accident or extraordinary event causes increased exposure, employees must have access to personal protective measures (PPM) for the protection of airways, eyes, hands and skin, depending on the nature of the performed activities. Suitable protection for airways must also be available where it is not technically possible to ensure the adherence of exposition limits identified for the work environment or ensure that exposure via airways will not affect the health of people. During non-stop use of these measures during permanent work, it is necessary to include safety breaks if the nature of the PPM requires them. All PPM need to be kept in usable condition and damaged or contaminated ones need to be immediately replaced**.**

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):
*(*the specific type of protective equipment must be chosen according to the type of activity being carried out and the quantity and concentration of the dangerous substance / mixture at the workplace)

- *Respiratory protection:* Protective mask compliant with EN 140 with a filter that is suitable against organic gases, insulation breathing apparatus (use the mask in case of insufficient ventilation and / or local exhaustion and product leakage);
- *Eye/face protection:* Protective chemical goggles compliant with EN 166;
- *Hand protection:* chemically resistant gloves tested according to EN 374, e.g. the following materials are suitable:

	Glove material	*Material thickness*	*Penetration time*
Regular work activities (staining risk)	nitrile	0.4 mm	30 minutes
Leak / accident liquidation	Viton	0.7 mm	480 minutes

- *Protection of other body parts:* Antistatic, inflammable protective clothes, antistatic shoes;
- *Thermal risk:* Not relevant for the given manner of the use.
- *Other measures:* We recommend that the workplace is equipped with a safety shower and eye rinse facilities.

8.2.3. Environmental exposure controls
Avoid product leakage to the environment with all available means. See section 6.2.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

The information is taken from the substance`s registration dossier (CSR) unless otherwise stated.

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Physical state		Liquid		at 20°C, 101,3 kPa
Colour		Colorless or light yellow		
Odour		Characteristic, aromatic		

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Odour threshold	[mg.m^{-3}]	*data for the components:* *4.68(benzene)* *140 (ethylbenzene)* *4.5 (xylenes)* *0.084 (naphthalene)* *240 (methylstyrenes)*	search data	CSR does not specify
Melting point/freezing point	[°C]	< -30 to +45		
Boiling point or Initial boiling point / boiling range	[°C]	167 - 225		key value for the safety assessment = value 192.7 ºC
Flammability (solid, gas, liquid)		Irrelevant		
Upper flammability / explosive limits	[%]	*data for the components:* *7.8 (benzene)* *6.8 (ethylbenzene)* *7.5 (xylenes)* *5.9 (naphthalene)* *7.2 (indene)* *11 (methylstyrenes)* *6.4 (2-methylindene)*	search data	CSR does not specify
Lower flammability / explosive limits	[%]	*data for the components:* *1.2 (benzene)* *0.8 (ethylbenzene)* *1.7 (xylenes)* *0.9 (naphthalene)* *1.0 (indene)* *0.8 (methylstyrenes)* *0.9 (2-methylindene)*	rešeršní údaje	CSR does not specify
Flash point	[°C]	36,5 – 76 53,5	CSR / own tests	key value for the safety assessment = value 46,4˚C / ISO 3679
Auto-ignition temperature	[°C]	409-505		
Decomposition temperature	[°C]	Does not decompose at normal usage temperatures		CSR does not specify
pH		Irrelevant		CSR does not specify
Kinematic viscosity	[mm^2/s]	1.1-1.9		at 20°C key value for the safety assessment = value 1,6 mm^2/s
Solubility in water	[mg.l^{-1}]	62-130		at 20°C key value for the safety assessment = value 100 mg/l
Partition coefficient: n-octanol/water	[log Kow]	1,46 – 7,08		at 20°C
Vapour pressure	[hPa]	2-41		at 20-25°C key value for the safety assessment = value 11,91 hPa
Relative density	Water=1	0,894-1,000		at 20°C key value for the safety assessment = value 0,945

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Relative vapour density	Air=1	*data for the components:* *2.8 (benzene)* *3.66 (ethylbenzene)* *4.5 (xylenes)* *4.42 (naphthalene)* *4.0 (indene)* *4.08 (methylstyrenes)* *4.5 (1,2-dihydroaphthalene)*	search data	CSR does not specify
Particle characteristics		Irrelevant		Not applicable - this is a liquid.

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Flammable liquids and gases

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Explosive properties		Substance is not explosive		CSR – DW
Oxidising properties		None		CSR - DW

9.2.2. Other safety characteristics

CHARACTERISTIC	UNIT	VALUE	SOURCE	NOTE
Evaporation rate	diethylether=1 butylacetate=1 diethylether=1 diethylether=1 butylacetate=1	*data for the components:* *2.8 (benzene)* *0.84 (ethylbenzene)* *8.8 (ethylbenzene)* *13.5 (xylenes)* *< 1 (naphthalene)*	search data	CSR does not specify
Dynamic viscosity	[mP.s]	2.39	CSR	

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
No threat of reactivity during storage and handling under the conditions listed in Section 7.

10.2. Chemical stability
The product is chemically stable when handled and stored under the conditions listed in Section 7.

10.3. Possibility of hazardous reactions
No threat of dangerous reactions during storage and handling under the conditions listed in Section 7.

10.4. Conditions to avoid
Sources of ignition (including static electricity), high temperature, creation of an explosive mixture with air.

10.5. Incompatible materials
Oxidizers.

10.6. Hazardous decomposition products
Heat decomposition at high temperatures, e.g. during fires, may cause the creation of carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke).

SECTION 11: TOXIKOLOGICAL INFORMATION

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

11.1.1. Toxicological effects of the substance

HAZARD CLASS	DATA FROM REGISTRATION DOCUMENTATION		EVALUATION
	DESCRIPTION	RESULT	
Acute toxicity	1/ oral: (OECD 401) 2/ dermal: 3/ inhalation: (OECD 403)	1/ LD_{50} (rat) = > 2000 mg/kg bw 2/ LD_{50} (rat) > 2000 mg/kg bw 3/ LC50 (rat)= >4,74 mg/l air (no mortality and no unwanted clinical symptoms upon exposure to the highest achievable tested concentration)	Meets the classification criteria (H302 a H332)
Skin corrosion/irritation		Product irritates skin	Meets the classification criteria (H315)
Serious eye damage/irritation		UVCB substance from this category irritates or does not irritate eyes depending on the composition	Meets the classification criteria (H319)
Sensitisation		Product, or its components do not cause allergic reactions	Does not meet the classification criteria
Germ cell mutagenicity		UVCB substance from this category containing ≥0.1% of benzene may induce detrimental genotoxic effects	Meets the classification criteria (H340)
Carcinogenicity		Conclusion: UVCB substance from this Category is considered to be carcinogens if they contain >=0.1% benzene or >=1% naphthalene.	splňuje kritéria pro klasifikaci (H350)
Reproductive toxicity		Conclusion: No harmful reproduction or development effects have been recorded when the substance contains < 3% of toulene	nesplňuje kritéria pro klasifikaci
STOT-single exposure		H335 classification is not required if the combined concentration of dicyclopentadiene and xylenes (irritant substances for the airways) < 10% H336 classification is not required if the UVCB substance contains < 20% of toluene	H335 classification within Category L. fractions C9-C10 (CAS 94733-07-0)
STOT-repeated exposure	1/ oral – systematic effects:	1/ NOAEL(rat) = <300 mg/kg bw/day Conclusion: No harmful effects have been recorded when the UVCB substance contains <1% of benzene and <10% of toluene	nesplňuje kritéria pro klasifikaci
Aspiration hazard		The product is hydrocarbon with a kinematic viscosity ≤ 20.5 $mm^2.s^{-1}$ at 40°C	Meets the classification criteria (H304)

11.1.2. Information on likely routes of exposure

Exposure may occur via inhalation, random consumption or by penetrating through skin.

11.1.3. Delayed and immediate effects as well as chronic effects from short and long-term exposure

Based on the size of exposure, the substance may cause headaches, sore throat, coughing, breathing difficulties, chest pressure, disruptions of the central nervous system, nausea, sleepiness and dizziness. Consumption may lead to abdomen spasms, spontaneous vomiting with a risk of aspiration and of chemical pneumonia, which may cause death. Direct contact with eyes or skin may cause their irritation and cause the affected area to turn red, swell and produce tears. Prolonged exposure of the skin to the substance may lead to ungreasing and crackles. The substance can trigger heritable genetic changes and cause or help cause cancer.

11.1.4. Interactive effects

There are no interactions for identified use.

11.2. Information on other hazards

The UVCB substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive due to the characteristics that can compromise endocrine activities or due to any other reason according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Water environment	Fish	Short-term toxicity: LC_{50} (96 h, fish) = 0,58-13,5 mg/l	OECD 203
		Short-term toxicity: LL_{50} (96 h, fish) = 0,73-6,3 mg/l	WAF
		Long-term toxicity: EL_{10} (60 d; Oncorhynchus mykiss, freshwater) = 0,125-0,779 mg/l	QSAR
	Invertebrates	EC_{50} (48 h, invertebrates) = 0,76-2,9 mg/l LC50 (96 h; marine, invertebrates) = 1,4 mg/l	OECD 202
		Short-term toxicity: EL50 (48 h; freshwater) = 0,91-3,3 mg/l	WAF
		Long-term toxicity EL50 (6-7 d; reproductive, freshwater) = 0,41-1,14 mg/l	WAF
	Algae	ErL_{50} (72 h, algae) = 1,3 – 6,3 mg/l	WAF
		EC50 (freshwater algae) = 1,3 mg/l EC10/LC10 nebo NOEC (freshwater algae) = 0,46 mg/l	OECD 201
		EL50 (Pseudokirchneriella subcapitata) = 0,48-2,99 mg/l	QSAR
Microbiological activity (STP)	Activated sludge	NOEC (56 d) = 47,2 mg/l LL50 = 42 - > 1000 mg/l	WAF QSAR

Note: An explanation of the meaning of the abbreviations is in section 16.

12.2. Persistence and degradability

Biological decomposability: The BIOHCwin and BIOWIN models predict that the majority of the constituents are expected to be biodegradable in water and soil. The category of UVCB substances is considered inherently biodegradable based on ready biodegradability tests and QSAR data. It is not feasible to perform simulation tests on complex, volatile UVCBs.

Persistent: The majority of the constituents in the Category of UVCB substances were found to have a half-life of <40 days and this is indicative of fast biodegradation.

Abiotic degradability:

- hydrolysis as a function of pH: the product is unaffected by hydrolysis,
- photolysis: the product is unaffected by photolysis,
- atmospheric oxidation: quick decomposition through indirect photolysis in the air is assumed.

12.3. Bioaccumulative potential

It is not feasible to perform simulation tests on complex, volatile UVCBs. The bioconcentration factor (BCF) values of the measured constituents of this category has been predicted using the EPISUITE v4.11 BCFBAF (2017) model, which uses methodology descrived by Arnot-Gobas et al. (2003, 2006, 2008). The predicted regression based BCF values range from 4 to 3090 L/kg ww. Of the 119 constituents, 1 has a BCF value of greater than 2000 L/kg ww. However, according to the Arnot-Gobas Method with 5% lipid normalisation, all the constituents show a BCF below 2000 L/Kg.

Based on the available information, there are no indications of a bioaccumulation potential. Secondary poisoning is thus considered irrelevant.

12.4. Mobility in soil

Determining this parameter with the use of standard method designed for simple substances is not suitable for a UVCB substance of the hydrocarbon. The log Koc of the constituents of this category have been predicted using the EPISUITE v4.11 KOCWIN (2017) program, which uses methodology described by Sabljic et al., (1995) and Meylan et al. (1995).

The predicted log Koc derived from Molecular Connectivity Index MCI for this category is 1.34 - 4.22

The predicted log Koc derived from log Kow for this category is 1.54 - 6.144.

12.5. Results of PBT and vPvB assessment

PBT status of the assessed substance: the substance is not PBT / vPvB (does not simultaneously meet the criteria for persistence, bioaccumulation and toxicity, nor for very persistence and very bioaccumulation according to Annex XIII of Regulation (EC) No. 1907/2006 REACH, and is therefore not identified as a PBT substance (P-persistent, B-bioaccumulative, T-toxic) or a vPvB substance (vP-very persistent, vB-very bioaccumulative).

Based on the results of screening assessment, was conclude that the Category does not contain constituents that meet the screening criteria for PBT or vPvB.

P: Does not meet the criteria. The majority of the constituents in the UVCBs have a freshwater half-life of <40 days.

B: Does not meet the criteria. Does not meet the criteria. The majority of the constituents in the UVCBs have a calculated BCF < 2000 L/kg.

T: The UVCB substance meets the toxicity criterion in the context of a PBT assessment. Classification: Carc. 1A and Muta 1B.

12.6. Endocrine disrupting properties

The UVCB substance is not included in the candidate list pursuant to Article 59 (Paragraph 1) of the REACH Directive due to the characteristics that can compromise endocrine activities or due to any other reason according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605.

12.7. Other adverse effects

Pursuant to Appendix 1 of Act No. 254/2001Coll. (the Water Act), the product is considered a hazardous harmful substance.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

If the remainder of the product is to be disposed (eg unused or leaked product), the valid European Union and national legislature as well as locally valid regulations have to be complied with. Deliver the waste for disposal to a professionally qualified person /to facility with the appropriate authorization to manage waste.

Recommended waste classification pursuant to COMMISSION DECISION of 18 December 2014, amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council:

13.1.1. Catalogue number

Catalogue number for products that have become waste:
07 01 04* Other organic solvents, washing liquids and mother liquors.
16 03 05* Organic waste containing dangerous substances.
Catalogue number for leaked product absorbed into an absorption agent (e.g. vapex):
15 02 02* Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances.
Catalogue number for soil contaminated by leaked product:
17 05 03* Soil and stones containing dangerous substances.

13.1.2. Recommended waste removal method
Deliver the unusable remainder of the product for disposal to a professionally qualified person with the appropriate authorization.
Recommended removal method: Energy utilization (burning)

13.1.3. Recommended methods of contaminated containers disposal
Not relevant. Product is not packed, it is transported through railroad cisterns.

13.1.4. Measures for limiting exposure when handling waste
Do not flush leaked product during an emergency event or accident into sewage. Proceed in accordance with instructions provided in Section 6 („Accidental release measures“) and in Subsection 8.2. („Limiting exposure“) and adhere to all valid legal regulations for the protection of people, air and water.

WARNING: *The stated information is of a recommendation character. It is related to the delivered, still unused material. Pursuant to the Waste Act, all responsibilities for managing the waste, including its assignment based on its type and category, are responsibilities of the waste originator*.

SECTION 14: TRANSPORT INFORMATION

The listed information applies to road transport (ADR) and rail (RID) transport of dangerous goods:

14.1. UN number or ID number: 3295
14.2. UN proper shipping name: HYDROCARBONS, LIQUID, N.O.S.
14.3. Transport hazard class(es): 3
14.4. Packing group: III
14.5. Environmental hazards: based on the criteria of the UN sample regulations, the product is harmful to the environment
14.6. Special precautions for user: none
14.7. Maritime transport in bulk according to IMO instruments: the product is not designated for bulk transport pursuant to the International Maritime Organization (IMO) documents

14.8. Other information

Hazard identification number: 30
Classification code: F1
Labels: 3 + label for substances endangering the environment (symbol: fish and tree)

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1. European Union
Regulation of the European Parliament and Council (EC) No. 1907/2006 (REACH), as amended

REGISTRATION (TITLE II OF THE REACH REGULATION)
the product was fully registered as a substance
AUTORISATION (TITLE VII OF THE REACH REGULATION)
the product is not listed in the list of substances in Annex XIV of EC Regulation No 1907/2006 REACH, and so no licensing obligation applies
RESTRICTION (TITLE VIII OF THE REACH REGULATION)
annex XVII – point 3., point 5., point 28. and point 40. (the product shall not be used in aerosol dispensers for amusement and decorative purposes intended for sale to the public) - restrictions are met by determining identified uses
Regulation of the European Parliament and Council (EC) No. 1272/2008 (CLP), as amended
the product has been classified in compliance with the stated regulation, packaging and labeling obligations of dangerous chemicals only apply to the product if it is marketed in packaging subject to its labelling according to CLP regulation
Regulation of the European Parliament and Council (EC) No. 649/2012 on the export and import of dangerous chemicals, as amended
the product is not subject to special import or export restrictions

15.1.2. Czech Republic
Act No. 350/2011 Coll. on Chemical Substances and Chemical Mixtures, as amended
the product is not subject to the obligation of notification to the information system PCN (Poison centres notification)
Act No. 258/2000 Coll. on the Protection of Public Health, as amended
Act No. 254/2001 Coll., on Water, as amended
Act No. 201/2012 Coll., on Air Protection, as amended
Act No. 541/2020 Coll., on Waste, as amended
Decree of Ministry of Environment no. 8/2021 Coll. laying down Waste Catalogue, as amended
Governmental decree no. 361/2007 Coll., laying down occupational health and safety conditions
product components have exposure limits; the product is subject to the obligation to establish a controlled zone
Act no. 224/2015 Coll., on prevention of serious accidents caused by selected dangerous chemical substances or mixtures

15.2. Chemical safety assessment

Chemical safety assessment was performed. The substance fulfils the criteria for being classified as dangerous in accordance with EC Regulation No. 1272/2008 CLP. Exposure assessment and following risk characterization have been performed. Exposure scenarios pursuant to Article 31 of Directive of the European Parliament and Council (EC) No. 1907/2006 (REACH) form an appendix to the corresponding safety data sheet.

SECTION 16: OTHER INFORMATION

Changes adopted as a part of the revision process

12/01/2009:	Revision (2):	Editing information in the sections 1, 2, 3, 9, 11, 12, 14, 15 and 16
12/01/2010:	Revision (3):	Editing information in the sections 1 (registration number), 2 (classification and labeling according to CLP), 3, 9 and 16
08/01/2011:	Revision (4):	Complete revision of the document in relation to the updating of Annex II of Regulation (EC) No 1907/2006 REACH in accordance with Annex I of Commission Regulation (EU) No 453/2010
	01/01/2012 / 4(1):	Section 15.1.2 – updating legislation
	01/06/2012 / 4(2):	Section 1.1 - identifiers, Section 1.3 – update contact and Section 16 – abbreviations
	05/31/2015 / 4(3):	Section 1 (contact information), Section 2, Section 15.1 (update of legal regulations) and 16 (text deletion)
	11/01/2016 / 4(4):	Section 1 (contact information), Section 14 and 15 (editing in accordance with Regulation (EC) no. 830/2015), Section 15 (legislation update)

02/01/2018 / 4(5): Unification of SDS format after the ČeR merger into UNIPETROL RPA, including the editing of data in sections 1, 8, 9, 11, 12, 13 15 and 16
02/01/2021: Revision (5) – Overall modification of the document in relation to the update of Appendix II of Directive (EC) No. 1907/2006 REACH, by Directive of the Council (EC) No. 2020/878;
Data modifications in Sections 2, 4, 6, 7, 8.1.2, 9.1, 11 and 12, and of the exposure scenarios included in the appendix in relation to the CSR update;
Data modification in Sections 13 and 15 - update of the legal regulations;
Data modification in Section 1 – change of the business company name;
05/08/2024 / 5(1): Section 8.1. – workplace exposure limit values (updated according to legal regulations),
05/08/2025: Revize (6): Overall modification of the document in connection with the update of the Safety Report (CSR) and replacement of the annex – Exposure scenarios;

Acronyms and abbreviations used in the text

ADR	Agreement concerning the International Carriage of Dangerous Goods by Road
CAS	Registration number assigned to the substance by the Chemical Abstracts Service of the American Chemical Society
CLP	EU Directive No. 1272/2008 on Classification, Labeling and Packaging of chemical substances and mixtures, which is implemented into the European legislature by the means of GHS (United Nations´ Globally harmonized System) for classifying and labeling chemical substances
CMR	Carcinogenic, mutagenic or toxic for reproduction
ČSN EN (ISO)	European standard incorporated into the Czech technical standards
CSR	Chemical Safety Report
DMEL	Derived minimal effect level - an exposure level that corresponds to a low and possibly theoretical risk, which should be considered as an acceptable risk (for threshholdless effects, i.e. there is no exposure level without effect))
DNEL	Derived no-effect level - level of exposure derived from toxicological data that does not produce any adverse effects on human health
DW	Data waiving
EC_{50}	Effective concentration EC_{50} is the concentration of substance that causes immobilization of 50% of individuals
ErC_{50}	Effective concentration EC_{50} is the concentration of substance that causes 50 % decrease of Algea growth
ECHA	European Chemicals Agency
ES	Official number of the chemical substance in the European Union: EINECS from the European Inventory of Existing Commercial Substances, or ELINCS from the European List of Notified Chemical Substances, or NLP from the No Longer Polymer list
HSDB	Hazardous Substances Data Bank
IATA	International Air Transport Association
IBC	Intermediate Bulk Container
IC_{50}	Inhibition concentration IC_{50} that causes inhibition of 50% of individuals
ICAO	International Civil Aviation Organization
ICE	"Intervention in Chemical Transport Emergencies" system providing both professional and practical assistance in dealing with emergency situations related to the transport and storage of hazardous chemicals
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
ISO	International Organization for Standardization
LC_{50}/LD_{50}	Lethal concentration/level is the concentration/level of substance that causes mortality of 50 % individuals
LOEC/LOEL	Lowest Observed Effect Concentration/Level
log Kow	Logarithm of distribution coefficient n-octanol/water
nf	Not feasible
NOAEC/NOAEL	No Observed Adverse Effect Concentration/No Observed Adverse Effect Level

NOEC/NOEL	No Observed Effect Concentration/No Observed Effect Level
NPK-P	The highest permitted concentration of the chemical substance in the air (the concentration of the substance that a worker may be exposed to for a maximum of 15 minutes but which must never be exceeded)
OECD	Organization for Economic Co-operation and Development
OOP	Recommended personal protective aids
OSN	United Nations
(Q)SAR	Quantitative Structure-Activity Relationship
PBT, vPvB	Persistent, bioaccumulative and toxic; high persistent and high bioaccumulative
PEL	Permitted exposure limit of the chemical substance in the air (the exposure value that an employee may be exposed to during the entire working shift (8 hours), without endangering his health during lifetime occupational exposure)
PMT, vPvM	Persistent, mobile and toxic, very persistent and very mobile
PNEC	Predicted No Effect Concentration
REACH	EU Directive No. 1907/2006 on Registration, Evaluation and Authorization of Chemicals
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
STOT	Specific Target Organ Toxicity
STP	Sewage treatment plant
su	Scientifically Unjustified
TRINS	Transport Information and Accident System of the Czech Republic, providing professional and practical assistance in dealing with emergency situations related to transport and storage of hazardous chemical substances, included in ICE
UACRON	Chemical database (The University of Akron).
UN	The four-digit identification number of the substance or object identifying hazardous material in international transport
UVCB	Substances of Unknown or Variable composition, Complex reaction products or Biological materials

Data sources used for preparing the material safety sheet

Annexes I, IV, VI and VII to Regulation (EC) No. 1272/2008 CLP, as amended;
Principles for providing first aid upon being exposed to chemical substances ;
Substance registration documentation pursuant to Regulation (EC) No. 1907/2006 REACH;
Decision of ECHA No SUB-D-2114147706-45-01/F on registration in accordance with EC Regulation No 1907/2006 REACH;
Research data sources (Hazardous Substances Data Bank HSDB, Sicherheitstechnische Kenndaten chemischer Stoffe SORBE, MedisAlarm, University of Akron Chemical UAKRON, Gestis sanitary limits);

Full text of H-/ EUH-sentences and abbreviations of hazard classes stated in Section 2 and/or 3

H 226	Flammable liquid and vapor.
H 302	Harmful if swallowed.
H 304	May be fatal if swallowed and enters airways.
H 315	Causes skin irritation.
H 319	Causes serious eye irritation.
H 332	Harmful if inhaled.
H 335	May cause respiratory irritation.
H 340	May cause genetic defects.
H 350	May cause cancer.
H 400	Very toxic to aquatic life.
H 410	Very toxic to aquatic life with long lasting effects.
H 411	Toxic to aquatic life with long lasting effects.

Acute Tox.	Acute toxicity
Aqauatic Chronic	Hazards to the aquatic environment, category Chronic toxicity
Aquatic Acute	Hazards to the aquatic environment, category Acute toxicity
Asp. Tox.	Aspiration hazard

Carc.	Carcinogenicity
Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquid
Muta	Germ cell mutagenicity
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity (single explosure)

Training instructions

Persons handling the product must be advised of the risks involved in handling the product and the health and environmental protection requirements (see applicable provisions of the Labor Code).

Access to information

Pursuant to Article 35 of Directive (EC) No. 1907/2006 REACH, every employer is obliged to allow access to the information stated on the given material safety sheet to all workers who use this product or are exposed to its impacts while working, and also to representatives of these workers.

Occupational exposure limit values for EU countries (see point 8.1.1)

data for Distillates (petroleum), cracked, ethylene manuf. by-product, C9-10 fraction (number CAS 94733-07-0)

Name	Country	8-hour limit [mg.m^{-3}]	Short-term limit [mg.m^{-3}]
Residues (petroleum), steam-cracked	European Union (Regulation No. 2000/39/EC as amended)	Limit values for the substance itself have not been determine *it is recommended to adhere to the limits determined for the components contained in the substance:*	
	Germany		
	Netherlands		
	Poland		
benzene / CAS 71-43-2	*European Union*	*1,65 / 0,66 [1] (skin)*	*not specified*
	Germany (AGS)	*1,9*	*15,2*
	Poland	*0,66 (skin)*	*not specified*
	France	*3,25 (skin)*	*not specified*
	Italy	*1,65 / 0,66 [1] (skin*	*not specified*
ethylbenzene / CAS 100-41-4	*European Union*	*442 (skin)*	*884 (skin)*
	Germany (AGS)	*88 (skin)*	*176 (skin)*
	Poland	*200 (skin)*	*400 (skin)*
	France	*88,4 (skin)*	*442 (skin)*
	Italy	*442 (skin)*	*884 (skin)*
xylenes / CAS 1330-20-7	*European Union*	*221 (skin)*	*442 (skin)*
	Germany (AGS)	*220 (skin)*	*440 (skin)*
	Poland	*100 (skin)*	*200 (skin)*
	France	*221 (skin)*	*442 (skin)*
	Italy	*221 (skin)*	*442 (skin)*
naphthtalene / CAS 91-20-3	*European Union*	*not specified*	*not specified*
	Germany (AGS)	*2 (Inhalable fraction and vapour / skin)*	*8 (Inhalable fraction and vapour / skin)*
	Poland	*20 (skin)*	*50 (skin)*
	France	*50*	*not specified*
	Italy	*50*	*not specified*
methylstyrenes / CAS 25013-15-4	*European Union*	*not specified*	*not specified*
	Germany (AGC)	*490*	*980*
	Poland	*100*	*300*
	France	*240*	*nestanoveno*
tetrahydronaphthtalene / CAS 119-64-2	*European Union*	*not specified*	*not specified*
	Germany (DFG)	*11 (Inhalable fraction and vapour)*	*11 (Inhalable fraction and vapour*
	Poland	*100*	*300*

8-hour limit: *Measured or calculated in relation to the 8-hour reference period as a timely weighted average*

Short-term limit: Exposure limit value, which shall not be exceeded and which corresponds to a 15-minute period

1) Limit value of 0.5 ppm (1.65 mg/m^3) from 5 April 2024 to 5 April 2026. Thereafter limit value of 0.2 ppm (0.66 mg/m^3).

Emergency telephone number for EU countries (see subsection 1.4)

National Centers		TELEFONE	LANGUAGE	Institution / website / email
Czech Republic		☎+420/224-919293; 915402	Czech	http://www.tis-cz.cz Toxikologické informační středisko (TIS) Na bojišti 1, 120 00 Praha 2 e-mail: tis@vfn.cz
Germany		☎+49/112, ☎+49/116117	German	
Germany - Berlin		☎+49/3019240	German	https://giftnotruf.charite.de
Germany - Bonn		☎+49/22819240	German	http://www.gizbonn.de/index.php?id=272
Germany - Erfurt		☎+49/361730730	German	https://www.ggiz-erfurt.de/home.html
Germany - Freiburg		☎+49/076119240	German	https://www.uniklinik-freiburg.de/giftberatung.html
Germany - Göttingen		☎+49/55119240	German	https://www.giz-nord.de/cms/index.php
Germany – Homburg/Saar		☎+49/684119240	German	http://www.uniklinikum-saarland.de/de/einrichtungen/kliniken_institute/kinder_und_jugendmedizin/informations_und_behandlungszentrum_fuer_vergiftungen_des_saarlandes
Germany – Mainz		☎+49/613119240	German	http://www.giftinfo.uni-mainz.de/index.php?id=24807
Germany - München		☎+49/8919240	German	http://www.toxinfo.med.tum.de
Netherlands		☎+31/302748888	Dutch	http://www.productnotification.nl/
Poland - Kraków		☎+48/124119999	Polish	http://www.oit.cm.uj.edu.pl
Poland – Gdansk		☎+48/586820404	Polish	http://www.pctox.pl/news.php
Poland – Poznaň		☎+48/618476946	Polish	http://www.raszeja.poznan.pl/oddzialy/oddzialtoksykologiczny
Poland - Warszawa		☎+48/607218174	Polish	okzit@burdpi.pol.pl
Austria		☎+43/14064343	German	Austrian Poison Information Centre (Vergiftungsinformationszentrale-VIZ)

Statement: *The material safety sheet has been prepared in compliance with Directive (EC) No. 1907/2006 REACH. It includes data that are necessary for securing occupational health and safety and the protection of the environment. These data have been provided in good faith, correspond to the current state of knowledge and experience and are in accordance with our valid legal regulations The data provided does not replace the quality specification and can not be considered as a guarantee of the suitability and usability of this product for a specific application. It is the responsibility of the product user to assess the accuracy of the information in a particular application where the product's properties can influence different factors. The consumer is responsible for compliance with the appropriate, regionally valid legal regulations.*

ANNEX OF MATERIAL SAFETY DATA SHEET

EXPOSURE SCENARIOS ACCORDING TO ARTICLE 31 OF REGULATION (EC) NO 1907/2006 (REACH) OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

The Annex contains **exposure scenarios** contained in **Chapter 9 of the chemical safety report dated 13/02/2025 (numbering from it is maintained here below**) for identified uses of the substance processed by Chesar v3.8

ES#	Exposure scenario (ES) name / Environmental contributing scenario	Pages
ES1 (M)	Manufacture of substance / Manufacture of substance (ECR 1)	-
ES2 (F)	Formulation & (re)packing of substances and mixtures / Formulation into mixture (ECR 2)	30 - 46
ES5 (IS)	Use in polymer production / Use in polymer production (ECR 6c)	47 - 61
M - Manufacture, F - Formulation, IS - Industrial end use at site		

9.0.2. Assessment entity group

Assessment entity group (AEG) name: CAS 94733-07-0
Composition of AEG: 6% Styrene, 31% DCPD (dicyclopentadiene), 15% Naphthalene

The risk and exposure assessment was performed on the basis of the content of selected components so-called hazard drivers (styrene, DCPD, naftalene) and their maximum possible content in the registered substance to cover the composition of all registrants of the substance. The content of styrene in the substance produced by ORLEN Unipetrol RPA is <1%. The content of DCPD in the substance produced by ORLEN Unipetrol RPA is <2%. The content of naftalene in the substance produced by ORLEN Unipetrol RPA is <2%.

9.0.3. Introduction to the assessment for the environment

Table 9.2. Tonnage for assessment

ES#	Exposure scenario (ES) name	Tonnage per use (t/year)
ES1 (M)	Manufacture of substance	3.31E4
ES2 (F)	Formulation & (re)packing of substances and mixtures	3.00E4
ES5 (IS)	Use in polymer production	1.83E5

General section for environmental contributing scenarios ENV CS (for ES 1, 2, 5)

Assessments were performed by using the PETRORISK model v8.01; it uses the hydrocarbon block method to calculate predicted environmental concentrations (PECs) for each environmental compartment. An extensive library for each >C4 molecules is used for each carbon block and chemical class to calculate exposures (PECs) and predicted no effect concentrations (PNECs) used to calculate risk characterisation ratios (RCR).

Table of Local Exposure Results from PETRORISK

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
Sector of Use	Industrial	Industrial	Industrial
Specific Environmental Release Category	ESVOC SPERC 1.1.v2	ESVOC SPERC 2.2.v2	LOA 20.1
(Generic) Environmental Release Category	ERC 1	ERC 2	ERC 6c
Regional Fraction (%)	100	100	100
Annual Continental Tonnage (T/y)	0	0	0
Annual Regional Tonnage (T/y)	33,070	30,000	18,270
Local Fraction (%)	90.7	100	0.84
Release Days	300	300	300

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
Daily Site Tonnage (T/d)	100	100	51
Release to Air, before RMMs (%)	5	2.5	50
Release to Water, before RMMs (%)	0.03	0.02	0
Release to Soil (%)	0.01	0.01	0.001
Release to Waste, before RMMs (%)	0.2	4	0
Default Onsite Air Treatment	None	None	None
Default Onsite Air Treatment Efficiency (%)	90	90	90
Applied Onsite Air Treatment Efficiency (%)	0	0	0
Wastewater Flow (L/d)	1.00E+07	2.00E+06	2.00E+06
Default Onsite Wastewater Treatment	Biological treatment with primary oil-water separation	Biological treatment with primary oil-water separation	None
Default Onsite Wastewater Treatment Efficiency (%)	98.26	98.3	0
Applied Onsite Wastewater Treatment Efficiency (%)	98.26	98.3	0
Release to Air, after RMMs (%)	5.01	2.5	50
Release to Water, after RMMs (%)	5.23E-04	3.48E-04	0
Release to Waste, after RMMs (%)	0.20	4	0
Municipal Sewage Treatment	None	None	Biological treatment with primary settler
Offsite Sewage Treatment Plant Efficiency (%)	0	0	97.6
Riverine Dilution Factor (unitless)	10	10	10
Marine Dilution Factor (unitless)	100	100	100
PREDICTED LOCAL CONCENTRATION			
Site Effluent Concentration (mg/L)	5.23E-02	1.74E-01	0
Concentration in Municipal STP (mg/L)	0	0	0
Dissolved Concentration in Freshwater (mg/L)	5.22E-03	1.74E-02	0
Concentration in Sediment (mg/kg dry weight)	6.86E-02	2.29E-01	0
Dissolved Concentration in Seawater (mg/L)	5.22E-04	1.74E-03	0
Concentration in Marine Sediment (mg/kg dry weight)	6.86E-03	2.29E-02	0
Concentration in Air (mg/m³)	1.39E+00	6.97E-01	7.089
Concentration in Agricultural Soil, 30-day average (mg/kg dry weight)	4.19E-03	2.10E-03	2.13E-02
Concentration in Agricultural Soil, 180-day average (mg/kg dry weight)	4.19E-03	2.10E-03	2.13E-02
Concentration in Freshwater Fish (mg/kg wet weight)	9.30E-03	3.10E-02	0
Concentration in Marine Fish (mg/kg wet weight)	9.30E-04	3.10E-03	0
Concentration in Marine Predators (mg/kg wet weight)	8.30E-06	2.77E-05	0
Concentration in Terrestrial Worms (mg/kg wet weight)	6.34E-03	3.17E-03	3.22E-02
PREDICTED ENVIRONMENTAL CONCENTRATION			
PEC Freshwater, dissolved (mg/L)	5.22E-03	1.74E-02	3.13E-07
PEC Sediment (mg/kg dry weight)	6.86E-02	2.29E-01	3.06E-06
PEC Seawater, dissolved (mg/L)	5.22E-04	1.74E-03	2.23E-08
PEC Marine Sediment (mg/kg dry weight)	6.86E-03	2.29E-02	2.42E-07
PEC Air (mg/m³)	1.39E+00	6.97E-01	7.09E+00
PEC Agricultural Soil, 30-day average (mg/kg dry weight)	4.19E-03	2.10E-03	2.13E-02
PEC Agricultural Soil, 180-day average (mg/kg dry weight)	4.19E-03	2.10E-03	2.13E-02
PEC Freshwater Fish (mg/kg wet weight)	9.30E-03	3.10E-02	1.78E-06

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
PEC Marine Fish (mg/kg wet weight)	9.30E-04	3.10E-03	1.43E-07
PEC Marine Predators (mg/kg wet weight)	8.31E-06	2.77E-05	7.33E-09
PEC Terrestrial Worms (mg/kg wet weight)	6.34E-03	3.17E-03	3.22E-02

Table of indirect human exposure (man via environment)

The environmental exposure was conducted using PETRORISK. The substance is not considered to be PBT/vPvB (CSR section 8). The assessment approach for man via the environment implemented for the substance using PETRORISK includes the use of the DCPD DNELs for oral and inhalation exposure routes.

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
Sector of Use	Industrial	Industrial	Industrial
Local Concentration in Fish (mg/kg ww)	5.01E-01	1.67E+00	0
Local Concentration in Root Crops (mg/kg ww)	2.90E-03	1.45E-03	1.45E-02
Local Concentration in Potato (mg/kg ww)	9.00E-04	4.50E-04	4.49E-03
Local Concentration in (Other) Leafy vegetables (mg/kg ww)	7.52E-03	3.78E-03	3.69E-02
Local Concentration in Lettuce (mg/kg ww)	1.12E-02	5.65E-03	5.50E-02
Local Concentration in Fruit (mg/kg ww)	1.59E-03	7.99E-04	7.89E-03
Local Concentration in Cereals (mg/kg ww)	1.05E-02	5.27E-03	5.13E-02
Local Concentration in Meat (mg/kg ww)	1.12E-02	5.61E-03	5.55E-02
Local Concentration in Milk (mg/kg ww)	3.91E-03	1.96E-03	1.94E-02
Local Concentration in Drinking Water (mg/L)	2.21E-03	7.37E-03	5.18E-03
Local Concentration in Air, annual (mg/m³)	1.14E+00	5.73E-01	5.83E+00
PEC Fish (mg/kg ww)	5.01E-01	1.67E+00	4.42E-05
PEC Root (mg/kg ww)	2.90E-03	1.45E-03	1.45E-02
PEC Potato (mg/kg ww)	9.00E-04	4.50E-04	4.49E-03
PEC Leaf (mg/kg ww)	7.52E-03	3.78E-03	3.69E-02
PEC Lettuce (mg/kg ww)	1.12E-02	5.65E-03	5.50E-02
PEC Fruit (mg/kg ww)	1.59E-03	7.99E-04	7.89E-03
PEC Cereal (mg/kg ww)	1.05E-02	5.27E-03	5.13E-02
PEC Meat (mg/kg ww)	1.12E-02	5.61E-03	5.55E-02
PEC Milk (mg/kg ww)	3.91E-03	1.96E-03	1.94E-02
PEC Drinking Water (mg/L)	2.21E-03	7.37E-03	5.18E-03
PEC Air, annual (mg/m³)	1.14E+00	5.73E-01	5.83E+00
Daily Intake of Fish (kg ww/d)	1.64E-03	1.64E-03	1.64E-03
Daily Intake of Root (kg ww/d)	1.27E-02	1.27E-02	1.27E-02
Daily Intake of Potato (kg ww/d)	2.83E-03	2.83E-03	2.83E-03
Daily Intake of Leaf (kg ww/d)	3.00E-04	3.00E-04	3.00E-04
Daily Intake of Lettuce (kg ww/d)	2.57E-04	2.57E-04	2.57E-04
Daily Intake of Fruit (kg ww/d)	4.54E-03	4.54E-03	4.54E-03
Daily Intake of Cereal (kg ww/d)	4.41E-03	4.41E-03	4.41E-03
Daily Intake of Meat (kg ww/d)	2.37E-03	2.37E-03	2.37E-03
Daily Intake of Milk (kg ww/d)	1.08E-02	1.08E-02	1.08E-02
Daily Intake of Drinking Water (L/d)	2.86E-02	2.86E-02	2.86E-02
Daily Intake of Soil (kg ww/d)	4.29E-03	4.29E-03	4.29E-03
Daily Intake of Air (m³/d)	5.49E-01	5.49E-01	5.49E-01
Intake Dose via Ingestion (mg/kg bw/d)	1.07E-03	3.05E-03	1.08E-03
Ingestion Dose resulting from Local Air Emissions (mg/kg bw/d)	1.83E-04	9.15E-05	1.08E-03

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
Ingestion Dose resulting from Local Wastewater Emissions (mg/kg bw/d)	8.87E-04	2.95E-03	0
Intake Dose via Inhalation (mg/kg bw/d)	6.28E-01	3.14E-01	3.20E+00

Table of Risk Characterisation Ratios from PETRORISK

Use Name	Manufacture of substance	Formulation & (re)packing	Polymer Production
Sector of Use	Industrial	Industrial	Industrial
RCR STP Micro-organisms	0	0	0
RCR Freshwater Organisms	7.69E-02	2.56E-01	5.83E-06
RCR Sediment Organisms	8.74E-02	2.91E-01	9.24E-06
RCR Seawater Organisms	7.69E-03	2.56E-02	4.69E-07
RCR Marine Sediment Organisms	8.74E-03	2.91E-02	7.78E-07
RCR Agricultural Soil Organisms	1.45E-02	7.24E-03	7.36E-02
RCR Freshwater (Fish-eating) Predators	1.06E-03	3.54E-03	2.03E-07
RCR Marine (Fish-eating) Predators	1.06E-04	3.54E-04	1.64E-08
RCR Marine Top Predators	9.47E-07	3.16E-06	8.35E-10
RCR Terrestrial (Worm-eating) Predators	7.23E-04	3.62E-04	3.70E-03
RCR Human Ingestion	7.14E-06	2.03E-05	7.09E-06
RCR Human Inhalation	8.45E-03	4.23E-03	4.30E-02
RCR Human Exposure	8.46E-03	4.25E-03	4.30E-02
MSafe (kg/d)	1.14E+06	3.43E+05	6.93E+05

Regional Exposure and Risk Characterisation Results from PETRORISK

Compartment	Value
Environmental Exposure	
PEC Air (mg/m³)	5.27E-05
PEC Freshwater, dissolved (mg/L)	3.13E-07
PEC Sediment (mg/kg dw)	3.06E-06
PEC Seawater, dissolved (mg/L)	2.23E-08
PEC Marine Sediment (mg/kg dry weight)	2.42E-07
PEC Natural Soil (mg/kg dry weight)	1.95E-07
PEC Freshwater Fish (mg/kg wet weight)	1.78E-06
PEC Marine Fish (mg/kg wet weight)	1.43E-07
PEC Marine Predator (mg/kg wet weight)	7.33E-09
PEC Terrestrial Worms (mg/kg wet weight)	7.19E-07
Environmental Risk Characterisation	
RCR Freshwater Organisms	5.83E-06
RCR Sediment Organisms	9.24E-06
RCR Marine Organisms	4.69E-07
RCR Marine Sediment Organisms	7.78E-07
RCR Natural Soil Organisms	1.02E-06
RCR Fresh Water (Fish-eating) Predators	2.03E-07
RCR Marine (Fish-eating) Predators	1.64E-08
RCR Marine Top Predators	8.35E-10
RCR Terrestrial (Worm-Eating) Predators	8.20E-08
Indirect Human Exposure	
PEC Fish (mg/kg wet weight)	4.42E-05
PEC Root (mg/kg wet weight)	6.22E-08

Compartment	Value
PEC Potato (mg/kg wet weight)	1.57E-08
PEC Leaf (mg/kg wet weight)	1.11E-06
PEC Lettuce (mg/kg wet weight)	1.51E-06
PEC Fruit (mg/kg wet weight)	1.11E-07
PEC Cereal (mg/kg wet weight)	1.20E-06
PEC Meat (mg/kg wet weight)	2.56E-06
PEC Milk (mg/kg wet weight)	7.16E-07
PEC Drinking Water (mg/kg wet weight)	1.71E-07
Human Daily Intake Dose via Ingestion (mg/kg body weight/d)	9.95E-08
Human Daily Intake Dose via Inhalation (mg/kg body weight/d)	2.89E-05
Indirect Human Risk	
RCR Human Ingestion (unitless)	6.63E-10
RCR Human Inhalation (unitless)	3.89E-07

PEC *Predicted Environmental Concentration*
RCR *Risk Characterization Ratio*

9.0.4. Introduction to the assessment for workers

9.0.4.1. Scope and type of assessment for workers

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 CSR section 5.11.

Table 9.3. Type of risk characterisation required for workers

Route	Type of effect	Assessment entity	Risk characterisation type	Hazard conclusion (see section 5.11)
Inhalation	Systemic effects - long term	Styrene	Quantitative	DNEL (Derived No Effect Level) = 85 mg/m³
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 1.06E3 mg/m³
		Naphthalene	Quantitative	DNEL (Derived No Effect Level) = 25 mg/m³
	Systemic effects - acute	Styrene	Quantitative	DNEL (Derived No Effect Level) = 289 mg/m³
		DCPD	Not needed	No hazard identified
		Naphthalene	Not needed	No hazard identified
	Local effects - long term	Styrene	Not needed	No hazard identified
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 2.31 mg/m³
		Naphthalene	Quantitative	DNEL (Derived No Effect Level) = 25 mg/m³
	Local effects - acute	Styrene	Quantitative	DNEL (Derived No Effect Level) = 306 mg/m³
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 160.2 mg/m³
		Naphthalene	Not needed	No hazard identified
Dermal	Systemic effects - long term	Styrene	Quantitative	DNEL (Derived No Effect Level) = 406 mg/kg bw/day
		DCPD	Quantitative	DNEL (Derived No Effect Level) = 0.3 mg/kg bw/day
		Naphthalene	Quantitative	DNEL (Derived No Effect Level) = 3.57 mg/kg bw/day
	Systemic effects - acute	Styrene	Not needed	No hazard identified
		DCPD	Not needed	No hazard identified
		Naphthalene	Not needed	No hazard identified
	Local effects - long term	Styrene	Not needed	No hazard identified
		DCPD	Not needed	No hazard identified
		Naphthalene	Not needed	No hazard identified
	Local effects - acute	Styrene	Not needed	No hazard identified
		DCPD	Not needed	No hazard identified
		Naphthalene	Not needed	No hazard identified
Eye	Local effects	Styrene	Not needed	No hazard identified
		DCPD	Qualitative	Low hazard (no threshold derived)
		Naphthalene	Not needed	No hazard identified

DCPD (dicyclopentadiene)

General section for worker contributing scenarios Worker CS (for ES 1, 2, 5)

Operational conditions and Risk Management measures (conditions of use) common for all contribution scenarios CS	**Method**
Product (Article) characteristics	
• Percentage (w/w) of substance in mixture/article: <= 100.0 %	TRA Workers 3.0
• Physical form of the used product: Liquid, including paste/slurry/suspension	TRA Workers 3.0
Amount used (or contained in articles), frequency and duration of use/exposure	
• Duration of activity: *see specific ´Conditions of use´ for a particular CS*	TRA Workers 3.0
Technical and organisational conditions and measures	
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
• General (room) ventilation: *see specific ´Conditions of use´ for a particular CS*	TRA Workers 3.0
• Local exhaust ventilation: *see specific ´Conditions of use´ for a particular CS*	TRA Workers 3.0
Conditions and measures related to personal protection, hygiene and health evaluation	
• Respiratory protection: No	TRA Workers 3.0
• Dermal protection: *see specific ´Conditions of use´ for a particular CS*	TRA Workers 3.0
• Face/eye protection: Eye protection	
General measures (eye irritants) *Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.*	
General measures (skin irritants) *Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely.* *Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop [E3].*	
Other conditions affecting workers exposure	
• Operating temperature: <= 20.0 °C *Assumes use at not more than 20°C above ambient temperature.* *The condition is valid for almost all CSs, unless exceptionally otherwise stated in specific ´Conditions of use´ for a particular CS.*	TRA Workers 3.0
• Place of use: *see specific ´Conditions of use´ for a particular CS*	TRA Workers 3.0
Additional good practice advice. Obligations according to Article 37(4) of REACH do not apply	
General measures (carcinogens) [G18]: *Consider technical advances and process upgrades (including automation) for the elimination of releases. Minimise exposure using measures such as closed systems, dedicated facilities and suitable general / local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean / flush equipment, where possible, prior to maintenance.* *Where there is potential for exposure: Restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and dispose of wastes safely.* *Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.* *Consider the need for risk based health surveillance. [G20].*	

Remarks on exposure dataset obtained with ECETOC TRA
Percentage (w/w) of Styrene in mixture/article: 6 %
Percentage (w/w) of DCPD in mixture/article: 31 %
Percentage (w/w) of Naphthalene in mixture/article: 15 %
The vapour pressure at operating temperature (20°C) used for the calculation is 667 Pa for Styrene.
The vapour pressure at operating temperature (20°C) used for the calculation is 186 Pa for DCPD.
The vapour pressure at operating temperature (20°C) used for the calculation is 9.793 Pa for Naphthalene.

Risk characterisation
Qualitative risk characterisation (Eye, local):
If conditions detailed in Section 9.0.4.2 are adhered to risks are minimised and safe use has been achieved.

9.0.4.2. Comments on assessment approach for workers

Concentration limits for uses in mixture

The following concentration limits are set for use in mixture. If the substance is in a mixture below those concentrations, qualitative risks are assumed to be controlled for the respective routes and types of effect:

- Eye effect (DCPD): 10%
  Explanation: Regulation (EC) No 1272/2008 (CLP) generic criteria for eye irritants.

Assessment approach related to toxicological hazard:

The inhalation and dermal exposures of workers were estimated using the ECETOC TRA version 3 modelling tool (ECETOC report TR 114, July 2012)

General information on risk management related to toxicological hazard:

H304 (ASPIRATION HAZARD), H315 (DERMAL HAZARD), H319 (EYE HAZARD), H332 (INHALATION HAZARD), H335 (INHALATION HAZARD), and H336 (INHALATION HAZARD).
This **qualitative** Chemical Safety Assessment (CSA) approach aims to reduce/avoid contact when there is no basis for setting a DNEL or DMEL for a certain human health adverse effect, i.e. when the available data for this adverse effect do not provide quantitative dose-response information, but there exist toxicity data appropriate to allow a qualitative risk characterisation.
This general qualitative risk assessment approach aims to reduce/avoid contact or incidents with the substance. Implementation of the following RMMs and operational conditions will ensure that the likelihood of an event occurring due to the hazard of the substance is negligible, and the risk is considered to be controlled to a level of no concern. The substance is classified as H304 (aspiration hazard), H315 (dermal hazard), H319 (eye hazard), H332 (inhalation), H335 (inhalation), and H336 (inhalation). The following RMMs and operational conditions would ensure minimal risk for each of the respective hazards.

- ASPIRATION HAZARD (H304) - Do not ingest. If swallowed then seek immediate medical assistance.
- DERMAL HAZARD (H315) - Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if direct hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin effects that may develop. Other skin protection measures such as impervious suits and face shields may be required during high dispersion activities which are likely to lead to substantial aerosol release, e.g. spraying.
- EYE HAZARD (H319) - Avoid direct eye contact with product, also via contamination on hands. Use suitable eye protection. Clean up contamination/spills as soon as they occur. Wash off eye contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any eye effects that may develop.
- INHALATION HAZARD (H332, H335 and H336) - Avoid breathing dust/fume/ gas/mist/vapours/spray. Ensure area is well ventilated.

For qualitative endpoints such as Skin Irritation (H315) and Eye Irritation (H319) risk management measures (RMMs) were implemented to ensure that risk is minimised. For inhalation hazard RMMs for good ventilation were implemented as part of the exposure assessment.

General information on risk management related to physicochemical hazard:

FLAMMABILITY HAZARD (H225/ H226)

• FLAMMABILITY HAZARD - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

INSTRUCTIONS FOR COMPLIANCE CHECK WITH THE EXPOSURE SCENARIO

Exposure estimates were conducted using the ECETOC TRA assessment method. If complying with the recommended risk management measures under the listed operating conditions, it is not expected that exposure could exceed the established DNEL/DMEL values.

Manufacturing processes do not present an unacceptable risk to the health of industrial workers if the exposures are controlled by appropriate operating conditions (eg task duration, use of ventilation) and risk management measures (eg. personal protective equipment) of such a type, that the exposures do not exceed the established DNELs / DMELs.

Where risk management measures / operational conditions have been modified, users must make sure that risks are controlled at least at equivalent levels.

9.2. Exposure scenario 2: Formulation or re-packing - Formulation & (re)packing of substances and mixtures

Environment contributing scenario(s):			**SPERC**
CS 1	Formulation into mixture	ERC 2	ESVOC SPERC 2.2.v2
Worker contributing scenario(s):			**SWED**
CS 2	General exposures (closed systems)	PROC 1	
CS 3	General exposures (closed systems); With sample collection	PROC 2	
CS 4	General exposures (closed systems); Batch process	PROC 3	
CS 5	General exposures	PROC 4	
CS 6	Batch process; Elevated temperature; Use in contained systems	PROC 3	
CS 7	Process sampling	PROC 9	
CS 8	Laboratory activities	PROC 15	
CS 9	Bulk transfers; Dedicated facility	PROC 8b	
CS 10	Mixing operations	PROC 5	
CS 11	Manual; Transfer from/pouring from containers; Non-dedicated facility	PROC 8a	
CS 12	Drum/batch transfers; Dedicated facility	PROC 8b	
CS 13	Tabletting, compression, extrusion or pelletisation	PROC 14	
CS 14	Drum and small package filling	PROC 9	
CS 15	Equipment cleaning and maintenance	**PROC 8a**, PROC 28	
CS 16	Storage	PROC 1	
CS 17	Storage	PROC 2	

Further description of the use:

Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities [GES2_I]

9.2.1. Environmental contributing scenario ENV CS 1: Formulation into mixture (ERC 2)

See PETRORISK modelling for the environmental compartment stated from page 21.

9.2.2. Worker CS 2: General exposures (closed systems) (PROC 1)

9.2.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.2.2. Exposure and risks for workers

Table 9.26. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	0.018 mg/m³ (TRA Workers) RCR = 2.14E-4	Final RCR < 0.01
	DCPD	0.039 mg/m³ (TRA Workers) RCR = 3.64E-5	
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, systemic, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.52E-4	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.039 mg/m³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, local, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.38E-4	Final RCR < 0.01
	DCPD	0.154 mg/m³ (TRA Workers) RCR = 9.63E-4	
Dermal, systemic, long term	Styrene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.02E-6	Final RCR = 0.011
	DCPD	3.4E-3 mg/kg bw/day (TRA Workers) RCR = 0.011	
	Naphthalene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.71E-4	
Combined routes, systemic, long-term			Final RCR = 0.011

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.3. Worker CS 3: General exposures (closed systems); With sample collection (PROC2)

9.2.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0

	Method
• Closed continuous process with occasional controlled exposure	
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.3.2. Exposure and risks for workers

Table 9.28. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	0.911 mg/m³ (TRA Workers) RCR = 0.011	Final RCR = 0.011
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, systemic, acute	Styrene	3.645 mg/m³ (TRA Workers) RCR = 0.013	Final RCR = 0.013
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, local, acute	Styrene	3.645 mg/m³ (TRA Workers) RCR = 0.012	Final RCR = 0.012
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.082 mg/kg bw/day (TRA Workers) RCR = 2.02E-4	Final RCR = 0.457
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
	Naphthalene	0.082 mg/kg bw/day (TRA Workers) RCR = 0.023	
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.4. Worker CS 4: General exposures (closed systems); Batch process (PROC 3)

9.2.4.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0

	Method
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.4.2. Exposure and risks for workers

Table 9.30. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	1.823 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.027
	DCPD	1.157 mg/m³ (TRA Workers) RCR = 1.09E-3	
	Naphthalene	0.673 mg/m³ (TRA Workers) RCR = 0.027	
Inhalation, systemic, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.025	Final RCR = 0.025
Inhalation, local, long term	DCPD	1.157 mg/m³ (TRA Workers) RCR = 0.501	Final RCR = 0.501
	Naphthalene	0.673 mg/m³ (TRA Workers) RCR = 0.027	
Inhalation, local, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.024	Final RCR = 0.029
	DCPD	4.627 mg/m³ (TRA Workers) RCR = 0.029	
Dermal, systemic, long term	Styrene	0.041 mg/kg bw/day (TRA Workers) RCR = 1.02E-4	Final RCR = 0.23
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.23	
	Naphthalene	0.041 mg/kg bw/day (TRA Workers) RCR = 0.012	
Combined routes, systemic, long-term			Final RCR = 0.231

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.5. Worker CS 5: General exposures (PROC 4)

9.2.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Provide extract ventilation to points where emissions occur.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.5.2. Exposure and risks for workers

Table 9.32. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.645 mg/m³ (TRA Workers) RCR = 0.043	Final RCR = 0.045
	DCPD	1.928 mg/m³ (TRA Workers) RCR = 1.82E-3	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, systemic, acute	Styrene	14.58 mg/m³ (TRA Workers) RCR = 0.05	Final RCR = 0.05
Inhalation, local, long term	DCPD	1.928 mg/m³ (TRA Workers) RCR = 0.835	Final RCR = 0.835
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, local, acute	Styrene	14.58 mg/m³ (TRA Workers) RCR = 0.048	Final RCR = 0.048
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.206 mg/kg bw/day (TRA Workers) RCR = 5.07E-4	Final RCR = 0.114
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.206 mg/kg bw/day (TRA Workers) RCR = 0.058	
Combined routes, systemic, long-term			Final RCR = 0.116

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.6. Worker CS 6: Batch process; Elevated temperature; Use in contained systems (PROC 3)

9.2.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 1 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Formulate in enclosed or ventilated mixing vessels. Ensure material transfers are under containment or extract ventilation.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Operating temperature: **<= 60 °C** *Elevated temperature*	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.6.2. Exposure and risks for workers

Table 9.34. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.781 mg/m³ (TRA Workers) RCR = 9.19E-3	Final RCR = 0.038
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.206
	DCPD	33.05 mg/m³ (TRA Workers) RCR = 0.206	
Dermal, systemic, long term	Styrene	8.28E-3 mg/kg bw/day (TRA Workers) RCR = 2.04E-5	Final RCR = 0.046
	DCPD	0.014 mg/kg bw/day (TRA Workers) RCR = 0.046	
	Naphthalene	8.28E-3 mg/kg bw/day (TRA Workers) RCR = 2.32E-3	
Combined routes, systemic, long-term			Final RCR = 0.048

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.7. Worker CS 7: Process sampling (PROC 9)

9.2.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 1 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.7.2. Exposure and risks for workers

Table 9.36. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	1.823 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.021
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, systemic, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.126	Final RCR = 0.126
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, local, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.119	Final RCR = 0.119
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.041 mg/kg bw/day (TRA Workers) RCR = 1.01E-4	Final RCR = 0.114
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.206 mg/kg bw/day (TRA Workers) RCR = 0.058	
Combined routes, systemic, long-term			Final RCR = 0.115

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.8. Worker CS 8: Laboratory activities (PROC 15)

9.2.8.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.8.2. Exposure and risks for workers

Table 9.38. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	1.823 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.045

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	DCPD	1.928 mg/m³ (TRA Workers) RCR = 1.82E-3	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, systemic, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.025	Final RCR = 0.025
Inhalation, local, long term	DCPD	1.928 mg/m³ (TRA Workers) RCR = 0.835	Final RCR = 0.835
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, local, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.024	Final RCR = 0.048
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.02 mg/kg bw/day (TRA Workers) RCR = 5.02E-5	Final RCR = 0.113
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.113	
	Naphthalene	0.02 mg/kg bw/day (TRA Workers) RCR = 5.71E-3	
Combined routes, systemic, long-term			Final RCR = 0.115

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.9. Worker CS 9: Bulk transfers; Dedicated facility (PROC 8b)

9.2.9.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%) *Ensure material transfers are under containment or extract ventilation.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.9.2. Exposure and risks for workers

Table 9.40. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	2.278 mg/m³ (TRA Workers) RCR = 0.027	Final RCR = 0.027
	DCPD	0.964 mg/m³ (TRA Workers) RCR = 9.11E-4	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, systemic, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.032	Final RCR = 0.032
Inhalation, local, long term	DCPD	0.964 mg/m³ (TRA Workers) RCR = 0.417	Final RCR = 0.417
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, local, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.03	Final RCR = 0.03
	DCPD	3.856 mg/m³ (TRA Workers) RCR = 0.024	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.115
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.138

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.10. Worker CS 10: Mixing operations (PROC 5)

9.2.10.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Provide extract ventilation to points where emissions occur.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.10.2. Exposure and risks for workers

Table 9.42. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.107	Final RCR = 0.107
	DCPD	1.928 mg/m³ (TRA Workers) RCR = 1.82E-3	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.126	Final RCR = 0.126
Inhalation, local, long term	DCPD	1.928 mg/m³ (TRA Workers) RCR = 0.835	Final RCR = 0.835
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, local, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.119	Final RCR = 0.119
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.229
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.23

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.11. Worker CS 11: Manual; Transfer from/pouring from containers; Non-dedicated facility (PROC 8a)

9.2.11.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Provide extract ventilation to points where emissions occur.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.11.2. Exposure and risks for workers

Table 9.44. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.906 mg/m³ (TRA Workers) RCR = 0.046	Final RCR = 0.046
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers)	Final RCR = 0.054

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 0.054	
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.051
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.229
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.23

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.12. Worker CS 12: Drum/batch transfers; Dedicated facility (PROC 8b)

9.2.12.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%) *Provide extract ventilation to points where emissions occur.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.12.2. Exposure and risks for workers

Table 9.46. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	2.278 mg/m³ (TRA Workers) RCR = 0.027	Final RCR = 0.027
	DCPD	0.964 mg/m³ (TRA Workers) RCR = 9.11E-4	
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, systemic, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.032	Final RCR = 0.032
Inhalation, local, long term	DCPD	0.964 mg/m³ (TRA Workers)	Final RCR = 0.417

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 0.417	
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, local, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.03	Final RCR = 0.03
	DCPD	3.856 mg/m³ (TRA Workers) RCR = 0.024	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.115
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.138

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.13. Worker CS 13: Tabletting, compression, extrusion or pelletisation (PROC 14)

9.2.13.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Handle substance within a predominantly closed system provided with extract ventilation.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.13.2. Exposure and risks for workers

Table 9.48. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.107	Final RCR = 0.107
	DCPD	1.928 mg/m³ (TRA Workers) RCR = 1.82E-3	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, systemic, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.126	Final RCR = 0.126
Inhalation, local, long term	DCPD	1.928 mg/m³ (TRA Workers)	Final RCR = 0.835

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 0.835	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, local, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.119	Final RCR = 0.119
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.103 mg/kg bw/day (TRA Workers) RCR = 2.53E-4	Final RCR = 0.572
	DCPD	0.172 mg/kg bw/day (TRA Workers) RCR = 0.572	
	Naphthalene	0.103 mg/kg bw/day (TRA Workers) RCR = 0.029	
Combined routes, systemic, long-term			Final RCR = 0.573

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.14. Worker CS 14: Drum and small package filling (PROC 9)

9.2.14.1. Conditions of use – specific to CS

	Method
• Duration of activity: <=8 h/day	TRA Workers 3.0
• Local exhaust ventilation: : Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Fill containers/cans at dedicated fill points supplied with local extract ventilation.*	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.14.2. Exposure and risks for workers

Table 9.50. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.107	Final RCR = 0.107
	DCPD	1.928 mg/m³ (TRA Workers) RCR = 1.82E-3	
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, systemic, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.126	Final RCR = 0.126
Inhalation, local, long term	DCPD	1.928 mg/m³ (TRA Workers) RCR = 0.835	Final RCR = 0.835

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Naphthalene	1.121 mg/m³ (TRA Workers) RCR = 0.045	
Inhalation, local, acute	Styrene	36.45 mg/m³ (TRA Workers) RCR = 0.119	Final RCR = 0.119
	DCPD	7.712 mg/m³ (TRA Workers) RCR = 0.048	
Dermal, systemic, long term	Styrene	0.206 mg/kg bw/day (TRA Workers) RCR = 5.07E-4	Final RCR = 0.114
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.206 mg/kg bw/day (TRA Workers) RCR = 0.058	
Combined routes, systemic, long-term			Final RCR = 0.116

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.15. Worker CS 15: Equipment cleaning and maintenance (PROC 8a, PROC 28)

9.2.15.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *Drain down and flush system prior to equipment break-in or maintenance.*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.15.2. Exposure and risks for workers

Table 9.52. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.906 mg/m³ (TRA Workers) RCR = 0.046	Final RCR = 0.046
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.051
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.229
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.23

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.16. Worker CS 16: Storage (PROC 1)

9.2.16.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure *Store substance within a closed system.*	
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: **Outdoor** (this eliminates the General ventilation condition)	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.16.2. Exposure and risks for workers

Table 9.54. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.018 mg/m³ (TRA Workers) RCR = 2.14E-4	Final RCR < 0.01
	DCPD	0.039 mg/m³ (TRA Workers) RCR = 3.64E-5	
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, systemic, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.52E-4	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.039 mg/m³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, local, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.38E-4	Final RCR < 0.01
	DCPD	0.154 mg/m³ (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 9.63E-4	
Dermal, systemic, long term	Styrene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.02E-6	Final RCR = 0.011
	DCPD	3.4E-3 mg/kg bw/day (TRA Workers) RCR = 0.011	
	Naphthalene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.71E-4	
Combined routes, systemic, long-term			Final RCR = 0.011

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.2.17. Worker CS 17: Storage (PROC 2)

9.2.17.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure *Store substance within a closed system.*	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.2.17.2. Exposure and risks for workers

Table 9.56. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.906 mg/m³ (TRA Workers) RCR = 0.046	Final RCR = 0.046
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.051
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.082 mg/kg bw/day (TRA Workers)	Final RCR = 0.457

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 2.02E-4	
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
	Naphthalene	0.082 mg/kg bw/day (TRA Workers) RCR = 0.023	
Combined routes, systemic, long-term			Final RCR = 0.458

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5. Exposure scenario 5: Use at industrial sites - Use in polymer production

Product category used: PC 32: Polymer Preparations and Compounds

Environment contributing scenario(s):		
CS 1	Use in polymer production	ERC 6c
Worker contributing scenario(s):		
CS 2	General exposures (closed systems); Continuous process	PROC 1
CS 3	General exposures; Closed systems; Continuous process	PROC 8b
CS 4	Polymerisation; Continuous process; With sample collection	PROC 2
CS 5	Polymerisation; Batch process; With sample collection	PROC 3
CS 6	Polymerisation; Batch process; Elevated temperature; With sample collection	PROC 3
CS 7	Finishing operations; Batch process; With sample collection	PROC 3
CS 8	Intermediate Bulk Container; Storage	PROC 4
CS 9	Additivation; Stabilisation; Batch process; With sample collection	PROC 3
CS 10	Mixing or blending in batch processes; Vessel / container	PROC 5
CS 11	Tabletting, compression, extrusion or pelletisation	PROC 6
CS 12	Bulk transfers; Closed systems	PROC 8b
CS 13	Tabletting, compression, extrusion or pelletisation	PROC 14
CS 14	Equipment cleaning and maintenance	**PROC 8a**, PROC 28
CS 15	Storage	PROC 1
CS 16	Storage	PROC 2

9.5.1. Environmental contributing scenario ENVCS1:Use in polymer production (ERC6c)

See PETRORISK modelling for the environmental compartment stated from page 21.

9.5.2. Worker CS 2: General exposures (closed systems); Continuous process (PROC 1)

9.5.2.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.2.2. Exposure and risks for workers

Table 9.96. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.018 mg/m³ (TRA Workers) RCR = 2.14E-4	Final RCR < 0.01
	DCPD	0.039 mg/m³ (TRA Workers) RCR = 3.64E-5	
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, systemic, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.52E-4	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.039 mg/m³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, local, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.38E-4	Final RCR < 0.01
	DCPD	0.154 mg/m³ (TRA Workers) RCR = 9.63E-4	
Dermal, systemic, long term	Styrene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.02E-6	Final RCR = 0.011
	DCPD	3.4E-3 mg/kg bw/day (TRA Workers) RCR = 0.011	
	Naphthalene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.71E-4	
Combined routes, systemic, long-term			Final RCR = 0.011

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.3. Worker CS 3: General exposures; Closed systems; Continuous process (PROC 8b)

9.5.3.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, enclosing hood with very high effectiveness such as fume cupboard (assumed effectiveness >= 95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.3.2. Exposure and risks for workers

Table 9.98. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	2.278 mg/m³ (TRA Workers) RCR = 0.027	Final RCR = 0.027
	DCPD	0.964 mg/m³ (TRA Workers)	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
		RCR = 9.11E-4	
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, systemic, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.032	Final RCR = 0.032
Inhalation, local, long term	DCPD	0.964 mg/m³ (TRA Workers) RCR = 0.417	Final RCR = 0.417
	Naphthalene	0.561 mg/m³ (TRA Workers) RCR = 0.022	
Inhalation, local, acute	Styrene	9.113 mg/m³ (TRA Workers) RCR = 0.03	Final RCR = 0.03
	DCPD	3.856 mg/m³ (TRA Workers) RCR = 0.024	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.115
	DCPD	0.034 mg/kg bw/day (TRA Workers) RCR = 0.114	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.138

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.4. Worker CS 4: Polymerisation Continuous process With sample collection (PROC2)

9.5.4.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.4.2. Exposure and risks for workers

Table 9.100. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.911 mg/m³ (TRA Workers) RCR = 0.011	Final RCR = 0.011
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, systemic, acute	Styrene	3.645 mg/m³ (TRA Workers) RCR = 0.013	Final RCR = 0.013
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.224 mg/m³ (TRA Workers) RCR = 8.97E-3	
Inhalation, local, acute	Styrene	3.645 mg/m³ (TRA Workers) RCR = 0.012	Final RCR = 0.012
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.041 mg/kg bw/day (TRA Workers) RCR = 1.01E-4	Final RCR = 0.228
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.228	
	Naphthalene	0.041 mg/kg bw/day (TRA Workers) RCR = 0.012	
Combined routes, systemic, long-term			Final RCR = 0.229

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.5 Worker CS 5: Polymerisation; Batch process; With sample collection (PROC 3)

9.5.5.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• Closed batch process with occasional controlled exposure	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.5.2. Exposure and risks for workers

Table 9.102. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	1.823 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.027
	DCPD	1.157 mg/m³ (TRA Workers) RCR = 1.09E-3	
	Naphthalene	0.673 mg/m³ (TRA Workers) RCR = 0.027	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.025	Final RCR = 0.025
Inhalation, local, long term	DCPD	1.157 mg/m³ (TRA Workers) RCR = 0.501	Final RCR = 0.501
	Naphthalene	0.673 mg/m³ (TRA Workers) RCR = 0.027	
Inhalation, local, acute	Styrene	7.29 mg/m³ (TRA Workers) RCR = 0.024	Final RCR = 0.029
	DCPD	4.627 mg/m³ (TRA Workers) RCR = 0.029	
Dermal, systemic, long term	Styrene	0.041 mg/kg bw/day (TRA Workers) RCR = 1.02E-4	Final RCR = 0.23
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.23	
	Naphthalene	0.041 mg/kg bw/day (TRA Workers) RCR = 0.012	
Combined routes, systemic, long-term			Final RCR = 0.231

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.6. Worker CS 6: Polymerisation; Batch process; Elevated temperature; With sample collection (PROC 3)

9.5.6.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 1 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Operating temperature: **<= 60 °C**	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.6.2. Exposure and risks for workers

Table 9.104. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.781 mg/m³ (TRA Workers) RCR = 9.19E-3	Final RCR = 0.038
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.206
	DCPD	33.05 mg/m³ (TRA Workers) RCR = 0.206	
Dermal, systemic, long term	Styrene	8.28E-3 mg/kg bw/day (TRA Workers) RCR = 2.04E-5	Final RCR = 0.046
	DCPD	0.014 mg/kg bw/day (TRA Workers) RCR = 0.046	
	Naphthalene	8.28E-3 mg/kg bw/day (TRA Workers) RCR = 2.32E-3	
Combined routes, systemic, long-term			Final RCR = 0.048

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.7. Worker CS 7: Finishing operations; Batch process; With sample collection (PROC 3)

9.5.7.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.7.2. Exposure and risks for workers

Table 9.106. Exposure concentrations and risks for workers

see Table 9.102. Exposure concentrations and risks for workers in Section 9.5.5.2.

9.5.8. Worker CS 8: Intermediate Bulk Container (IBC); Storage (PROC 4)

9.5.8.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0

	Method
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see "General part (for ESs 1,2,5)" from p. 26.

9.5.8.2. Exposure and risks for workers

Table 9.108. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	0.608 mg/m³ (TRA Workers) RCR = 7.15E-3	Final RCR < 0.01
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, systemic, acute	Styrene	2.43 mg/m³ (TRA Workers) RCR = 8.41E-3	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, local, acute	Styrene	2.43 mg/m³ (TRA Workers) RCR = 7.94E-3	Final RCR < 0.01
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.069 mg/kg bw/day (TRA Workers) RCR = 1.69E-4	Final RCR = 0.457
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
	Naphthalene	0.069 mg/kg bw/day (TRA Workers) RCR = 0.019	
Combined routes, systemic, long-term			Final RCR = 0.458

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.9. Worker CS 9: Additivation; Stabilisation; Batch process; With sample collection (PROC 3)

9.5.9.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool	TRA Workers 3.0

	Method
extraction or enclosing hoods (assumed effectiveness >= 90-95%)	
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.9.2. Exposure and risks for workers

Table 9.110. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	0.304 mg/m³ (TRA Workers) RCR = 3.57E-3	Final RCR < 0.01
	DCPD	0.231 mg/m³ (TRA Workers) RCR = 2.19E-4	
	Naphthalene	0.112 mg/m³ (TRA Workers) RCR = 4.49E-3	
Inhalation, systemic, acute	Styrene	1.215 mg/m³ (TRA Workers) RCR = 4.2E-3	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.231 mg/m³ (TRA Workers) RCR = 0.1	Final RCR = 0.1
	Naphthalene	0.112 mg/m³ (TRA Workers) RCR = 4.49E-3	
Inhalation, local, acute	Styrene	1.215 mg/m³ (TRA Workers) RCR = 3.97E-3	Final RCR < 0.01
	DCPD	0.925 mg/m³ (TRA Workers) RCR = 5.78E-3	
Dermal, systemic, long term	Styrene	6.9E-3 mg/kg bw/day (TRA Workers) RCR = 1.7E-5	Final RCR = 0.046
	DCPD	0.014 mg/kg bw/day (TRA Workers) RCR = 0.046	
	Naphthalene	6.9E-3 mg/kg bw/day (TRA Workers) RCR = 1.93E-3	
Combined routes, systemic, long-term			Final RCR = 0.046

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.10. Worker CS 10: Mixing or blending in batch processes; Vessel/container (PROC 5)

9.5.10.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee	TRA Workers 3.0

	Method
training. (effectiveness >= 95%)	
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.10.2. Exposure and risks for workers

Table 9.112. Exposure concentrations and risks for workers

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, long term	Styrene	1.519 mg/m³ (TRA Workers) RCR = 0.018	Final RCR = 0.018
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, systemic, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.021
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, local, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.02	Final RCR = 0.02
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.069 mg/kg bw/day (TRA Workers) RCR = 1.69E-4	Final RCR = 0.457
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
	Naphthalene	0.069 mg/kg bw/day (TRA Workers) RCR = 0.019	
Combined routes, systemic, long-term			Final RCR = 0.457

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.11. Worker CS 11: Tabletting, compression, extrusion or pelletisation (PROC 6)

9.5.11.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see "General part (for ESs 1,2,5)" from p. 26.

9.5.11.2. Exposure and risks for workers

Table 9.114. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	1.519 mg/m³ (TRA Workers) RCR = 0.018	Final RCR = 0.018
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, systemic, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.021
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, local, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.02	Final RCR = 0.02
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.137 mg/kg bw/day (TRA Workers) RCR = 3.38E-4	Final RCR = 0.914
	DCPD	0.274 mg/kg bw/day (TRA Workers) RCR = 0.914	
	Naphthalene	0.137 mg/kg bw/day (TRA Workers) RCR = 0.038	
Combined routes, systemic, long-term			Final RCR = 0.915

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.12. Worker CS 12: Bulk transfers; Closed systems (PROC 8b)

9.5.12.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see "General part (for ESs 1,2,5)" from p. 26.

9.5.12.2. Exposure and risks for workers

Table 9.116. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.255 mg/m³ (TRA Workers) RCR = 0.038	Final RCR = 0.038
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.801 mg/m³ (TRA Workers) RCR = 0.032	
Inhalation, systemic, acute	Styrene	13.01 mg/m³ (TRA Workers) RCR = 0.045	Final RCR = 0.045
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.801 mg/m³ (TRA Workers) RCR = 0.032	
Inhalation, local, acute	Styrene	13.01 mg/m³ (TRA Workers) RCR = 0.043	Final RCR = 0.043
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.137 mg/kg bw/day (TRA Workers) RCR = 3.38E-4	Final RCR = 0.914
	DCPD	0.274 mg/kg bw/day (TRA Workers) RCR = 0.914	
	Naphthalene	0.137 mg/kg bw/day (TRA Workers) RCR = 0.038	
Combined routes, systemic, long-term			Final RCR = 0.916

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.13. Worker CS 13: Tabletting, compression, extrusion or pelletisation (PROC 14)

9.5.13.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: **<= 5 %**	TRA Workers 3.0
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Good (3-5 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%)	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.13.2. Exposure and risks for workers

Table 9.118. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	1.519 mg/m³ (TRA Workers) RCR = 0.018	Final RCR = 0.018

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	DCPD	0.386 mg/m³ (TRA Workers) RCR = 3.64E-4	
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, systemic, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.021	Final RCR = 0.021
Inhalation, local, long term	DCPD	0.386 mg/m³ (TRA Workers) RCR = 0.167	Final RCR = 0.167
	Naphthalene	0.187 mg/m³ (TRA Workers) RCR = 7.48E-3	
Inhalation, local, acute	Styrene	6.075 mg/m³ (TRA Workers) RCR = 0.02	Final RCR = 0.02
	DCPD	1.542 mg/m³ (TRA Workers) RCR = 9.63E-3	
Dermal, systemic, long term	Styrene	0.034 mg/kg bw/day (TRA Workers) RCR = 8.45E-5	Final RCR = 0.229
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
	Naphthalene	0.034 mg/kg bw/day (TRA Workers) RCR = 9.61E-3	
Combined routes, systemic, long-term			Final RCR = 0.229

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.14. Worker CS 14: Equipment cleaning and maintenance (PROC 8a, PROC 28)

9.5.14.1. Conditions of use – specific to CS

	Method
• Percentage (w/w) of substance in mixture/article: <= 100 %	TRA Workers 3.0
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: Yes, specifically designed fixed capturing hood, on tool extraction or enclosing hoods (assumed effectiveness >= 90-95%) *LEV has been added to equate to the SOP. Drain down and flush system prior to equipment break-in or maintenance [E55]*	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with specific employee training. (effectiveness >= 95%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.14.2. Exposure and risks for workers

Table 9.120. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.906 mg/m³ (TRA Workers) RCR = 0.046	Final RCR = 0.046

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.051
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.411 mg/kg bw/day (TRA Workers) RCR = 1.01E-3	Final RCR = 0.229
	DCPD	0.069 mg/kg bw/day (TRA Workers) RCR = 0.229	
	Naphthalene	0.411 mg/kg bw/day (TRA Workers) RCR = 0.115	
Combined routes, systemic, long-term			Final RCR = 0.23

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.15. Worker CS 15: Storage (PROC 1)

9.5.15.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed process without likelihood of exposure *Store substance within a closed system.*	
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: **Outdoor** (this eliminates the General ventilation condition)	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.15.2. Exposure and risks for workers

Table 9.122. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	0.018 mg/m³ (TRA Workers) RCR = 2.14E-4	Final RCR < 0.01
	DCPD	0.039 mg/m³ (TRA Workers) RCR = 3.64E-5	

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, systemic, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.52E-4	Final RCR < 0.01
Inhalation, local, long term	DCPD	0.039 mg/m³ (TRA Workers) RCR = 0.017	Final RCR = 0.017
	Naphthalene	0.022 mg/m³ (TRA Workers) RCR = 8.97E-4	
Inhalation, local, acute	Styrene	0.073 mg/m³ (TRA Workers) RCR = 2.38E-4	Final RCR < 0.01
	DCPD	0.154 mg/m³ (TRA Workers) RCR = 9.63E-4	
Dermal, systemic, long term	Styrene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.02E-6	Final RCR = 0.011
	DCPD	3.4E-3 mg/kg bw/day (TRA Workers) RCR = 0.011	
	Naphthalene	2.04E-3 mg/kg bw/day (TRA Workers) RCR = 5.71E-4	
Combined routes, systemic, long-term			Final RCR = 0.011

RCR = Risk Characterization Ratio (RCR <1 safe use)

9.5.16. Worker CS 16: Storage (PROC 2)

9.5.16.1. Conditions of use – specific to CS

	Method
• Duration of activity: <= 8.0 h/day	TRA Workers 3.0
• Closed continuous process with occasional controlled exposure *Store substance within a closed system.*	
• General ventilation: Enhanced (5-10 air changes per hour)	TRA Workers 3.0
• Local exhaust ventilation: No	TRA Workers 3.0
• Dermal protection: Chemical resistant dermal protection with basic employee training. (effectiveness >= 90%)	TRA Workers 3.0
• Place of use: Indoor	TRA Workers 3.0

Note: conditions of use common to all ESs apply at the same time, see “General part (for ESs 1,2,5)” from p. 26.

9.5.16.2. Exposure and risks for workers

Table 9.124. Exposure concentrations and risks for workers

Route of exposure and type of effects	Assessment entity	Exposure concentration	Risk quantification
Inhalation, systemic, long term	Styrene	3.906 mg/m³ (TRA Workers) RCR = 0.046	Final RCR = 0.046
	DCPD	1.653 mg/m³ (TRA Workers) RCR = 1.56E-3	
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	

Route of exposure and type of effects	**Assessment entity**	**Exposure concentration**	**Risk quantification**
Inhalation, systemic, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.054	Final RCR = 0.054
Inhalation, local, long term	DCPD	1.653 mg/m³ (TRA Workers) RCR = 0.715	Final RCR = 0.715
	Naphthalene	0.961 mg/m³ (TRA Workers) RCR = 0.038	
Inhalation, local, acute	Styrene	15.62 mg/m³ (TRA Workers) RCR = 0.051	Final RCR = 0.051
	DCPD	6.61 mg/m³ (TRA Workers) RCR = 0.041	
Dermal, systemic, long term	Styrene	0.082 mg/kg bw/day (TRA Workers) RCR = 2.02E-4	Final RCR = 0.457
	DCPD	0.137 mg/kg bw/day (TRA Workers) RCR = 0.457	
	Naphthalene	0.082 mg/kg bw/day (TRA Workers) RCR = 0.023	
Combined routes, systemic, long-term			Final RCR = 0.458

RCR = Risk Characterization Ratio (RCR <1 safe use)