

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	: Substance (UVCB)
Trade name	: Piperylene
EC Index-No.	: 649-399-00-9
EC-No.	: 310-013-6
CAS-No.	: 102110-15-6
REACH registration No	: 01-2119495687-16
Product code	: P510
Formula	: Unspecified

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

1.2.1. Relevant identified uses

Main use category	: Industrial use
Industrial/Professional use spec	: Industrial For professional use only
Use of the substance/mixture	: Product for industrial use only

Title	Use descriptors
Polymer production (ES Ref.: ES16)	PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC14, PROC21, PROC28, ERC6c

Full text of use descriptors: see section 16

1.2.2. Uses advised against

No additional information available

1.3. Details of the supplier of the safety data sheet

Supplier (Only Representative):
 Braskem Netherland BV
 Weena 238-240, 9th Floor, Tower C
 NL - 3012 NJ – Rotterdam
 T +31 10 798 5002
 productsafety@braskem.com

1.4. Emergency telephone number

Emergency number : +1 703-741-5970 (International – 24h)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Flammable liquids, Category 2	H225
Acute toxicity (oral), Category 4	H302
Acute toxicity (inhal.), Category 4	H332
Skin corrosion/irritation, Category 2	H315
Serious eye damage/eye irritation, Category 2	H319
Germ cell mutagenicity, Category 1B	H340
Carcinogenicity, Category 1B	H350
Reproductive toxicity, Category 2	H361
Specific target organ toxicity – Single exposure, Category 3, Narcosis	H336
Specific target organ toxicity – Single exposure, Category 3, Respiratory tract irritation	H335
Aspiration hazard, Category 1	H304
Hazardous to the aquatic environment – Acute Hazard, Category 1	H400
Hazardous to the aquatic environment – Chronic Hazard, Category 1	H410

Full text of H- and EUH-statements: see section 16

Adverse physicochemical, human health and environmental effects

Highly flammable liquid and vapour. Harmful if swallowed or if inhaled. Causes skin irritation. Causes serious eye irritation. May cause genetic defects. May cause cancer. Suspected of damaging fertility or the unborn child. May cause drowsiness or dizziness. May cause respiratory irritation. May be fatal if swallowed and enters airways. Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

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2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



Signal word (CLP) :

Danger

Hazard statements (CLP) :

- H225 - Highly flammable liquid and vapour.
 - H302+H332 - Harmful if swallowed or if inhaled.
 - H304 - May be fatal if swallowed and enters airways.
 - H315 - Causes skin irritation.
 - H319 - Causes serious eye irritation.
 - H335 - May cause respiratory irritation.
 - H336 - May cause drowsiness or dizziness.
 - H340 - May cause genetic defects.
 - H350 - May cause cancer.
 - H361 - Suspected of damaging fertility or the unborn child.
 - H410 - Very toxic to aquatic life with long lasting effects.
- Precautionary statements (CLP) :
- P201 - Obtain special instructions before use.
 - P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 - P273 - Avoid release to the environment.
 - P280 - Wear eye protection, protective gloves, protective clothing.
 - P301+P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor.
 - P331 - Do NOT induce vomiting.
 - P235 - Keep cool.

2.3. Other hazards

other hazards which do not result in classification : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level. Burning liquid may float on water. May spread fire.

This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII

This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

Contains no PBT/vPvB substances $\geq 0.1\%$ assessed in accordance with REACH Annex XIII

The substance is not included in the list established in accordance with Article 59(1) of REACH for having endocrine disrupting properties, or is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605

SECTION 3: Composition/information on ingredients

3.1. Substances

Substance type : UVCB
Name : Hydrocarbons, C5-rich, dicyclopentadiene-containing
CAS-No. : 102110-15-6
EC-No. : 310-013-6
EC Index-No. : 649-399-00-9

Name	Product identifier	%
Hydrocarbons, C5-rich, dicyclopentadiene-containing	CAS-No.: 102110-15-6 EC-No.: 310-013-6 EC Index-No.: 649-399-00-9 REACH-no: 01-2119495687-16	100
1,3-Pentadiene, (E)-	CAS-No.: 2004-70-8 EC-No.: 217-909-5	33 – 38
1,3-Pentadiene, (Z)-	CAS-No.: 1574-41-0 EC-No.: 216-401-0	20 – 23

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Name	Product identifier	%
Cyclopentene	CAS-No.: 142-29-0 EC-No.: 205-532-9	14 – 17
Cyclopentane	CAS-No.: 287-92-3 EC-No.: 206-016-6 EC Index-No.: 601-030-00-2	8 – 11
2-Methyl-2-butene	CAS-No.: 513-35-9 EC-No.: 208-156-3	>5
Cyclopentadiene	CAS-No.: 542-92-7 EC-No.: 208-835-4	0 – 5
n-Pentane	CAS-No.: 109-66-0 EC-No.: 203-692-4 EC Index-No.: 601-006-00-1	< 5
Dicyclopentadiene	CAS-No.: 77-73-6 EC-No.: 201-052-9 EC Index-No.: 601-044-00-9	0 – 4
hydrocarbonates	CAS-No.: Not available	< 2
1,3-Butadiene, 2-methyl-	CAS-No.: 78-79-5 EC-No.: 201-143-3 EC Index-No.: 601-014-00-5	< 1

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures general	: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
First-aid measures after inhalation	: Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Do not apply mouth-to-mouth resuscitation. Get medical advice/attention if you feel unwell.
First-aid measures after skin contact	: After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water and soap. Immediately rinse with plenty of water (for at least 15 minutes). Wash contaminated clothing before reuse. Get medical advice if skin irritation persists.
First-aid measures after eye contact	: Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Avoid any direct contact with the product. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
First-aid measures after ingestion	: If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Do not induce vomiting. If swallowed, rinse mouth with water (only if the person is conscious). Keep victim warm and rested. Seek immediate medical advice.

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

Symptoms/effects	: May cause genetic defects. May cause cancer. Suspected of damaging fertility or the unborn child.
Symptoms/effects after inhalation	: Harmful if inhaled. May cause drowsiness or dizziness. May cause respiratory irritation. Overexposure to vapours may result in cough.
Symptoms/effects after skin contact	: Causes skin irritation.
Symptoms/effects after eye contact	: Causes serious eye irritation.
Symptoms/effects after ingestion	: Harmful if swallowed. Ingestion may cause nausea, vomiting and diarrhea. May result in aspiration into the lungs, causing chemical pneumonia. May be fatal if swallowed and enters airways.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	: Carbon dioxide (CO ₂), dry chemical powder, foam. Foam. Dry powder. Carbon dioxide. Sand.
Unsuitable extinguishing media	: Do not use water jet. Do not use a heavy water stream.

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5.2. Special hazards arising from the substance or mixture

- Fire hazard : Highly flammable liquid and vapour. Material can accumulate some static charge during transfer. May mass explode in fire. Vapours are heavier than air and may travel considerable distance to an ignition source and flash back to source of vapours. Incomplete combustion releases dangerous carbon monoxide, carbon dioxide and other toxic gases.
- Explosion hazard : May mass explode in fire. May form flammable/explosive vapour-air mixture.

5.3. Advice for firefighters

- Firefighting instructions : In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. In case of fire: stop leak if safe to do so. Hose down area with water. Cool adjacent tanks / containers / drums with water jet. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire fighting water from entering the environment.
- Protective equipment for firefighters : In case of hazardous fumes, wear autonomous breathing apparatus. Full protective flameproof clothing. Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Avoid ignition sources. Remove ignition sources. Use special care to avoid static electric charges. No open flames. No smoking.

6.1.1. For non-emergency personnel

- Protective equipment : Complete protective clothing. For further information refer to section 8: "Exposure controls/personal protection".
- Emergency procedures : In case of leakage, eliminate all ignition sources. Do not drink, eat or smoke in the workplace. Impermeable protective equipment. Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Complete protective clothing. Do not enter fire area without proper protective equipment, including respiratory protection. Evacuate unnecessary personnel. Equip cleanup crew with proper protection. For further information refer to section 8: "Exposure controls/personal protection".
- Emergency procedures : In case of leakage, eliminate all ignition sources. Evacuate unnecessary personnel. Ventilate area. Impermeable protective equipment.

6.2. Environmental precautions

Air. Use water curtains to contain the toxic clouds. In soil and sediments : Take up liquid spill into absorbent material, e.g.: sand, earth, vermiculite or powdered limestone. Absorb remaining liquid with sand or inert absorbent and remove to safe place. Water : Containment as appropriate. Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters. Avoid release to the environment.

6.3. Methods and material for containment and cleaning up

- For containment : Clean up any spills as soon as possible, using an absorbent material to collect it. Stop leak without risks if possible. Keep away from sources of ignition - No smoking. Wear recommended personal protective equipment. Do not touch spilled material. Evacuate unnecessary personnel.
- Methods for cleaning up : Depending on the local regulations it may be disposed of as solid waste or incinerated in a suitable installation. Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents). Stop leak if safe to do so. Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

6.4. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection". For disposal of residues refer to section 13 : "Disposal considerations".

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Additional hazards when processed : Handle empty containers with care because residual vapours are flammable.
- Precautions for safe handling : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid ignition sources. Product can accumulate electrostatic charges that may cause fire by electrical discharges. Use only non-sparking tools. Use grounded electrical/mechanical equipment. Spilled product must never be returned to the original container for recycling. Provide good ventilation in process area to prevent formation of vapour. No open flames. No smoking. Wash contaminated clothing before reuse.

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Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Keep container closed when not in use. Keep away from sources of ignition. Use only in well ventilated areas. Proper grounding procedures to avoid static electricity should be followed. Ground/bond container and receiving equipment. Use explosion-proof electrical equipment.

Storage conditions : Keep away from open flames, hot surfaces and sources of ignition. Store in dry, cool, well-ventilated area. At room temperature the product is neither an irritant nor gives off hazardous vapours. Use only non-sparking tools. Keep in fireproof place. Keep container tightly closed.

Incompatible materials : Strong oxidizing agents. Halogens. Strong acids and oxidants. Reducing agents. Certain plastics, rubbers and coatings. Strong bases.

Storage area : Store in dry, cool, well-ventilated area. Keep away from sources of ignition. Keep away from heat and direct sunlight.

Packaging materials : Storage in steel recommended.

7.3. Specific end use(s)

See Section 1.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

8.1.1 National occupational exposure and biological limit values

2-Methyl-2-butene (513-35-9)	
USA - ACGIH - Occupational Exposure Limits	
ACGIH OEL TWA [ppm]	10 ppm
Cyclopentane (287-92-3)	
Belgium - Occupational Exposure Limits	
Local name	Cyclopentane # Cyclopentaan
OEL TWA	1800 mg/m ³
OEL TWA [ppm]	600 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Denmark - Occupational Exposure Limits	
Local name	Cyclopentan
OEL TWA [1]	850 mg/m ³
OEL TWA [2]	300 ppm
Regulatory reference	BEK nr 1054 af 28/06/2022
France - Occupational Exposure Limits	
Local name	Cyclopentane
VME (OEL TWA)	1720 mg/m ³
VME (OEL TWA) [ppm]	600 ppm
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Greece - Occupational Exposure Limits	
Local name	Κυκλοπεντάνιο
OEL TWA	1720 mg/m ³
OEL TWA [ppm]	600 ppm

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Cyclopentane (287-92-3)	
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Ireland - Occupational Exposure Limits	
Local name	Cyclopentane
OEL TWA [1]	1720 mg/m ³
OEL TWA [2]	600 ppm
OEL STEL	5160 mg/m ³ (calculated)
OEL STEL [ppm]	1800 ppm (calculated)
Regulatory reference	Chemical Agents Code of Practice 2021
Portugal - Occupational Exposure Limits	
Local name	Ciclopentano
OEL TWA [ppm]	600 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Spain - Occupational Exposure Limits	
Local name	Ciclopentano
VLA-ED (OEL TWA) [1]	1745 mg/m ³
VLA-ED (OEL TWA) [2]	600 ppm
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
USA - ACGIH - Occupational Exposure Limits	
Local name	Cyclopentane
ACGIH OEL TWA [ppm]	1000 ppm (EX - Explosion hazard)
Remark (ACGIH)	TLV® Basis: CNS impair
Regulatory reference	ACGIH 2022
Cyclopentadiene (542-92-7)	
Austria - Occupational Exposure Limits	
Local name	1,3-Cyclopentadien
MAK (OEL TWA)	200 mg/m ³
MAK (OEL TWA) [ppm]	75 ppm
Regulatory reference	BGBI. II Nr. 238/2018
Belgium - Occupational Exposure Limits	
Local name	1,3-Cyclopentadiène # 1,3-Cyclopentadiéen
OEL TWA	206 mg/m ³
OEL TWA [ppm]	75 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Циклопентадиен
OEL TWA	200 mg/m ³
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)

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Cyclopentadiene (542-92-7)	
Denmark - Occupational Exposure Limits	
Local name	Cyclopentadien
OEL TWA [1]	200 mg/m ³
OEL TWA [2]	75 ppm
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	1,3-tsüklopentadieen
OEL TWA	200 mg/m ³
OEL TWA [ppm]	75 ppm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	Syklopentadieeni
HTP (OEL TWA) [1]	210 mg/m ³
HTP (OEL TWA) [2]	75 ppm
HTP (OEL STEL)	330 mg/m ³
HTP (OEL STEL) [ppm]	120 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystieteiden ministeriö)
France - Occupational Exposure Limits	
Local name	Cyclopentadiène
VME (OEL TWA)	200 mg/m ³
VME (OEL TWA) [ppm]	75 ppm
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Greece - Occupational Exposure Limits	
Local name	Κυκλοπενταδιένιο, 1,3-
OEL TWA	200 mg/m ³
OEL TWA [ppm]	75 ppm
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	1,3-CIKLOPENTADIÉN
AK (OEL TWA)	200 mg/m ³
Remark	i (ingerlő anyag, amely izgatja a bőrt, nyálkahártyát, szemet vagy mindhármát); N (Irritáló anyagok, egyszerű fojtógázok, csekély egészségkárosító hatással bíró anyagok)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Cyclopentadiene
OEL TWA [1]	203 mg/m ³
OEL TWA [2]	75 ppm

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Cyclopentadiene (542-92-7)	
OEL STEL	609 mg/m ³ (calculated)
OEL STEL [ppm]	225 ppm (calculated)
Regulatory reference	Chemical Agents Code of Practice 2021
Lithuania - Occupational Exposure Limits	
Local name	Ciklopentadienas
IPRV (OEL TWA)	5 mg/m ³
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Poland - Occupational Exposure Limits	
Local name	Cyklopenta-1,3-dien (cyklopentadien-1,3)
NDS (OEL TWA)	200 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Ciclopentadieno
OEL TWA [ppm]	75 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Ciclopentadienă
OEL TWA	100 mg/m ³
OEL TWA [ppm]	35.5 ppm
OEL STEL	200 mg/m ³
OEL STEL [ppm]	75 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Spain - Occupational Exposure Limits	
Local name	Ciclopentadieno
VLA-ED (OEL TWA) [1]	206 mg/m ³
VLA-ED (OEL TWA) [2]	75 ppm
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
Norway - Occupational Exposure Limits	
Local name	1,3-syklopentadien
Grenseverdi (OEL TWA) [1]	110 mg/m ³
Grenseverdi (OEL TWA) [2]	40 ppm
Korttidsverdi (OEL STEL)	137.5 mg/m ³ (value calculated)
Korttidsverdi (OEL STEL) [ppm]	60 ppm (value calculated)
Regulatory reference	FOR-2021-06-28-2248
USA - ACGIH - Occupational Exposure Limits	
Local name	Cyclopentadiene
ACGIH OEL TWA [ppm]	0.5 ppm
ACGIH OEL STEL [ppm]	1 ppm
Remark (ACGIH)	TLV® Basis: URT, LRT, & eye irr; CNS eff

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Cyclopentadiene (542-92-7)	
Regulatory reference	ACGIH 2022
Dicyclopentadiene (77-73-6)	
Belgium - Occupational Exposure Limits	
Local name	Dicyclopentadiène # Dicyclopentadiëen
OEL TWA	27 mg/m ³
OEL TWA [ppm]	5 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	Дициклопентадиен
OEL TWA	20 mg/m ³
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Diciklopentadien; 3a,4,7,7a-tetrahydro-4,7-metanoinden
GVI (OEL TWA) [1]	27 mg/m ³
GVI (OEL TWA) [2]	5 ppm
Remark	Koža (razvrstana kao tvar koja nadražuje kožu (H315))
OEL chemical category	Skin notation
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, graničnim vrijednostima izloženosti i biološkim graničnim vrijednostima (NN 1/2021)
Czech Republic - Occupational Exposure Limits	
Local name	Dicyklopentadien
PEL (OEL TWA)	3 mg/m ³
PEL (OEL TWA) [ppm]	0.5 ppm
NPK-P (OEL C)	6 mg/m ³
NPK-P (OEL C) [ppm]	1 ppm
Remark	I - dráždí sliznice (oči, dýchací cesty), respektive kůži.
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Dicyclopentadien
OEL TWA [1]	2.7 mg/m ³
OEL TWA [2]	0.5 ppm
Regulatory reference	BEK nr 1054 af 28/06/2022
Finland - Occupational Exposure Limits	
Local name	Disyklopentadiëeni
HTP (OEL STEL)	5.5 mg/m ³
HTP (OEL STEL) [ppm]	1 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystieteiden ministeriö)

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Dicyclopentadiene (77-73-6)	
France - Occupational Exposure Limits	
Local name	Dicyclopentadiène
VME (OEL TWA)	30 mg/m ³
VME (OEL TWA) [ppm]	5 ppm
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	3a,4,7,7a-Tetrahydro-4,7-methanoinden
AGW (OEL TWA) [1]	2.7 mg/m ³
AGW (OEL TWA) [2]	0.5 ppm
Peak exposure limitation factor	1(l)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission)
Regulatory reference	TRGS900
Greece - Occupational Exposure Limits	
Local name	Δικυκλοπενταδιένιο
OEL TWA	30 mg/m ³
OEL TWA [ppm]	5 ppm
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Ireland - Occupational Exposure Limits	
Local name	Dicyclopentadiene
OEL TWA [1]	30 mg/m ³
OEL TWA [2]	5 ppm
OEL STEL	90 mg/m ³ (calculated)
OEL STEL [ppm]	15 ppm (calculated)
Regulatory reference	Chemical Agents Code of Practice 2021
Lithuania - Occupational Exposure Limits	
Local name	Diciklopentadienas
IPRV (OEL TWA)	1 mg/m ³
Remark	K (kancerogeninis poveikis); M (mutageninis poveikis); O (medžiaga į organizmą gali prasiskverbti pro nepažeistą odą)
OEL chemical category	Mutagen, Carcinogen, Skin notation
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Poland - Occupational Exposure Limits	
Local name	3a,4,7,7a-Tetrahydro-4,7-metanoinden (dicyklopentadien)
NDS (OEL TWA)	10 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Diciclopentadieno

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Dicyclopentadiene (77-73-6)	
OEL TWA [ppm]	5 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Slovenia - Occupational Exposure Limits	
Local name	3a,4,7,7a-tetrahidro-4,7-metanoinden
OEL TWA	2.7 mg/m ³
OEL TWA [ppm]	0.5 ppm
OEL STEL	2.7 mg/m ³
OEL STEL [ppm]	0.5 ppm
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
Spain - Occupational Exposure Limits	
Local name	Diciclopentadieno
VLA-ED (OEL TWA) [2]	5 ppm
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
Norway - Occupational Exposure Limits	
Local name	Disyklopentadien
Grønseverdi (OEL TWA) [1]	30 mg/m ³
Grønseverdi (OEL TWA) [2]	5 ppm
Korttidsverdi (OEL STEL)	45 mg/m ³ (value calculated)
Korttidsverdi (OEL STEL) [ppm]	10 ppm (value calculated)
Regulatory reference	FOR-2021-06-28-2248
USA - ACGIH - Occupational Exposure Limits	
Local name	Dicyclopentadiene, including Cyclopentadiene
ACGIH OEL TWA [ppm]	0.5 ppm
ACGIH OEL STEL [ppm]	1 ppm (including cyclopentadiene)
Remark (ACGIH)	TLV® Basis: URT, LRT, & eye irr; CNS eff
Regulatory reference	ACGIH 2022
n-Pentane (109-66-0)	
EU - Indicative Occupational Exposure Limit (IOEL)	
Local name	Pentane
IOEL TWA	3000 mg/m ³
IOEL TWA [ppm]	1000 ppm
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC COMMISSION DIRECTIVE 2006/15/EC
Austria - Occupational Exposure Limits	
Local name	Pentan (alle Isomeren): n-Pentan
MAK (OEL TWA)	1800 mg/m ³
MAK (OEL TWA) [ppm]	600 ppm
MAK (OEL STEL)	3600 mg/m ³ (3x 60(Mow) min)
MAK (OEL STEL) [ppm]	1200 ppm (3x 60(Mow) min)

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n-Pentane (109-66-0)	
Regulatory reference	BGBI. II Nr. 156/2021
Belgium - Occupational Exposure Limits	
Local name	Pentane, tous isomères # Pentaan, alle isomeren
OEL TWA	1800 mg/m ³
OEL TWA [ppm]	600 ppm
OEL STEL	2250 mg/m ³
OEL STEL [ppm]	750 ppm
Regulatory reference	Koninklijk besluit/Arrêté royal 11/05/2021
Bulgaria - Occupational Exposure Limits	
Local name	n-Пентан
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Remark	• (Химични агенти, за които са определени гранични стойности във въздуха на работната среда за Европейската общност)
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Croatia - Occupational Exposure Limits	
Local name	Pentan
GVI (OEL TWA) [1]	3000 mg/m ³
GVI (OEL TWA) [2]	1000 ppm
Remark	Direktiva: 2006/15/EZ
Regulatory reference	Pravilnik o zaštiti radnika od izloženosti opasnim kemikalijama na radu, граниčnim vrijednostima izloženosti i biološkim граниčnim vrijednostima (NN 1/2021)
Cyprus - Occupational Exposure Limits	
Local name	Πεντάνιο
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Κανονισμοί του 2007 (Κ.Δ.Π. 295/2007)
Czech Republic - Occupational Exposure Limits	
Local name	Pentan
PEL (OEL TWA)	3000 mg/m ³
PEL (OEL TWA) [ppm]	999 ppm
NPK-P (OEL C)	4500 mg/m ³ (3)
NPK-P (OEL C) [ppm]	1499 ppm (3)
Remark	(3) Je brán zřetel na fyzikálně-chemické vlastnosti (například výbušnost).
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
Denmark - Occupational Exposure Limits	
Local name	Pentan, alle isomere: Pentan
OEL TWA [1]	1500 mg/m ³

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n-Pentane (109-66-0)	
OEL TWA [2]	500 ppm
Remark	E (betyder, at stoffet har en EF-grænseværdi)
Regulatory reference	BEK nr 1054 af 28/06/2022
Estonia - Occupational Exposure Limits	
Local name	Pentaan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 15.05.2021, 1)
Finland - Occupational Exposure Limits	
Local name	n-Pentaani
HTP (OEL TWA) [1]	1500 mg/m ³
HTP (OEL TWA) [2]	500 ppm
HTP (OEL STEL)	1900 mg/m ³
HTP (OEL STEL) [ppm]	630 ppm
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystieteiden ministeriö)
France - Occupational Exposure Limits	
Local name	n-Pentane (Pentane)
VME (OEL TWA)	3000 mg/m ³
VME (OEL TWA) [ppm]	1000 ppm
Remark	Valeurs réglementaires contraignantes
Regulatory reference	Article R4412-149 du Code du travail (réf.: INRS ED 984, 2016; Décret n° 2019-1487; Décret n° 2020-1546; Décret n° 2021-434; Décret n° 2021-1849)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Pentan
AGW (OEL TWA) [1]	3000 mg/m ³ (the risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed)
AGW (OEL TWA) [2]	1000 ppm (the risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed)
Peak exposure limitation factor	2(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich); Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
Local name	Pentane
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Factories (Control of Chemical Agents at Work) Regulations 2003 (LN. 2018/181)

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n-Pentane (109-66-0)	
Greece - Occupational Exposure Limits	
Local name	Πεντάνιο (όλα τα ισομερή)
OEL TWA	2950 mg/m ³
OEL TWA [ppm]	1000 ppm
OEL STEL	2950 mg/m ³
OEL STEL [ppm]	1000 ppm
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	n-PENTÁN
AK (OEL TWA)	2950 mg/m ³
Remark	EU2 (2006/15/EK irányelvben közölt érték); R (Azok az anyagok, amelyek egészségkárosító hatása RÖVID expozíció hatására jelentkezik)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Ireland - Occupational Exposure Limits	
Local name	Pentane
OEL TWA [1]	3000 mg/m ³
OEL TWA [2]	1000 ppm
OEL STEL [ppm]	3000 ppm (calculated)
Remark	IOELV (Indicative Occupational Exposure Limit Values)
Regulatory reference	Chemical Agents Code of Practice 2021
Italy - Occupational Exposure Limits	
Local name	Pentano
OEL TWA	2000 mg/m ³
OEL TWA [ppm]	667 ppm
Regulatory reference	Allegato XXXVIII del D.Lgs. 9 aprile 2008, n. 81 e s.m.i.
Latvia - Occupational Exposure Limits	
Local name	Pentāns
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325
Lithuania - Occupational Exposure Limits	
Local name	Pentanas
IPRV (OEL TWA)	3000 mg/m ³
IPRV (OEL TWA) [ppm]	1000 ppm
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Luxembourg - Occupational Exposure Limits	
Local name	Pentane
OEL TWA	3000 mg/m ³

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n-Pentane (109-66-0)	
OEL TWA [ppm]	1000 ppm
Regulatory reference	Mémorial A N° 226 de 2021 concernant la protection de la sécurité et de la santé des salariés contre les risques liés à des agents chimiques sur le lieu de travail
Malta - Occupational Exposure Limits	
Local name	Pentane
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	S.L.424.24 - Chemical Agents at Work Regulations (L.N.356 of 2021)
Netherlands - Occupational Exposure Limits	
Local name	n-Pentaan
TGG-8u (OEL TWA)	1800 mg/m ³
Regulatory reference	Arbeidsomstandighedenregeling 2022
Poland - Occupational Exposure Limits	
Local name	Pentan
NDS (OEL TWA)	3000 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286
Portugal - Occupational Exposure Limits	
Local name	Pentano, todos os isómeros
OEL TWA	3000 mg/m ³ (indicative limit value)
OEL TWA [ppm]	1000 ppm
Regulatory reference	Norma Portuguesa NP 1796:2014
Romania - Occupational Exposure Limits	
Local name	Pentan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
Slovakia - Occupational Exposure Limits	
Local name	Pentán
NPHV (OEL TWA) [1]	3000 mg/m ³
NPHV (OEL TWA) [2]	1000 ppm
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
Slovenia - Occupational Exposure Limits	
Local name	pentan
OEL TWA	3000 mg/m ³
OEL TWA [ppm]	1000 ppm
OEL STEL	6000 mg/m ³
OEL STEL [ppm]	2000 ppm
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021

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n-Pentane (109-66-0)	
Spain - Occupational Exposure Limits	
Local name	n-Pentano
VLA-ED (OEL TWA) [1]	3000 mg/m ³ (indicative limit value)
VLA-ED (OEL TWA) [2]	1000 ppm (indicative limit value)
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2022. INSHT
Sweden - Occupational Exposure Limits	
Local name	n-Pentan
NGV (OEL TWA)	1800 mg/m ³ (Pentanes)
NGV (OEL TWA) [ppm]	600 ppm (Pentanes)
KTV (OEL STEL)	2000 mg/m ³ (Pentanes)
KTV (OEL STEL) [ppm]	750 ppm (Pentanes)
Remark	V (Vägledande korttidsgränsvärde ska användas som ett rekommenderat högsta värde som inte bör överskridas)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
Norway - Occupational Exposure Limits	
Local name	Pentan
Grenseverdi (OEL TWA) [1]	750 mg/m ³
Grenseverdi (OEL TWA) [2]	250 ppm
Korttidsverdi (OEL STEL)	937.5 mg/m ³ (value calculated)
Korttidsverdi (OEL STEL) [ppm]	312.5 ppm (value calculated)
Remark	E: EU har en veiledende grenseverdi og/eller anmerkning for stoffet.
Regulatory reference	FOR-2021-06-28-2248
USA - ACGIH - Occupational Exposure Limits	
Local name	Pentane
ACGIH OEL TWA [ppm]	1000 ppm
Remark (ACGIH)	TLV® Basis: Narcosis; resp tract irr
Regulatory reference	ACGIH 2022
1,3-Butadiene, 2-methyl- (78-79-5)	
Austria - Occupational Exposure Limits	
OEL chemical category	Group A2 Carcinogen
Bulgaria - Occupational Exposure Limits	
Local name	Изопрен (2-метил-1,3-бутадиен)
OEL TWA	40 mg/m ³
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Isopren
AGW (OEL TWA) [1]	8.4 mg/m ³ (carcinogenic substance Cat. 1A/1B)

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1,3-Butadiene, 2-methyl- (78-79-5)	
AGW (OEL TWA) [2]	3 ppm (carcinogenic substance Cat. 1A/1B)
Peak exposure limitation factor	8(II)
Remark	AGS - Ausschuss für Gefahrstoffe; X - Krebserzeugender Stoff der Kat. 1A oder 1B oder krebserzeugende Tätigkeit oder Verfahren nach § 2 Absatz 3 Nr. 4 der Gefahrstoffverordnung – es ist zusätzlich § 10 GefStoffV zu beachten
Regulatory reference	TRGS900
Latvia - Occupational Exposure Limits	
Local name	Izoprēns (2-metil-1,3-butadiēns)
OEL TWA	40 mg/m ³
Remark	Carc. 1B; Muta. 2
Regulatory reference	Ministru kabineta 2008. gada 29. septembra noteikumi Nr. 803 (Grozījumi Ministru kabineta 2020. gada 7. janvārī noteikumiem Nr. 10).
Lithuania - Occupational Exposure Limits	
Local name	Izoprenas
IPRV (OEL TWA)	40 mg/m ³
Remark	K (kancerogeninis poveikis); M (mutageninis poveikis)
OEL chemical category	Mutagen, Carcinogen
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
Poland - Occupational Exposure Limits	
Local name	Izopren
NDS (OEL TWA)	100 mg/m ³
NDSCh (OEL STEL)	300 mg/m ³
Regulatory reference	Dz. U. 2018 poz. 1286

8.1.2. Recommended monitoring procedures

No additional information available

8.1.3. Air contaminants formed

No additional information available

8.1.4. DNEL and PNEC

Piperylene (102110-15-6)	
DNEL/DMEL (Workers)	
Acute - systemic effects, dermal	No hazard identified
Acute - systemic effects, inhalation	No hazard identified
Acute - local effects, dermal	No hazard identified
Acute - local effects, inhalation	160.23 mg/m ³
Long-term - systemic effects, dermal	0.95 mg/kg bodyweight/day
Long-term - local effects, dermal	No hazard identified
Long-term - systemic effects, inhalation	2.31 mg/m ³
Long-term - local effects, inhalation	2.31 mg/m ³
PNEC (Water)	
PNEC aqua (freshwater)	0.001 mg/l

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Piperylene (102110-15-6)	
PNEC aqua (marine water)	0.001 mg/l
PNEC (Sediment)	
PNEC sediment (freshwater)	No hazard identified
PNEC sediment (marine water)	No hazard identified
PNEC (Soil)	
PNEC soil	No hazard identified
PNEC (Oral)	
PNEC oral (secondary poisoning)	No bioaccumulation potential
PNEC (STP)	
PNEC sewage treatment plant	No hazard identified

8.1.5. Control banding

No additional information available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

Appropriate engineering controls:

Mechanical ventilation is recommended. Explosion-free electrical equipment and lighting with earth.

8.2.2. Personal protection equipment

8.2.2.1. Eye and face protection

Eye protection:

Full face piece respirator. Chemical goggles or safety glasses

8.2.2.2. Skin protection

Skin and body protection:

Use chemically protective clothing

Hand protection:

Impermeable protective gloves. Do not reuse gloves. It is recommended that the glove supplier be consulted to ensure the protective gloves are resistant to chemicals in this product

Hand protection					
Type	Material	Permeation	Thickness (mm)	Penetration	Standard
Disposable gloves, E.g. KCL Type: 730 or 890 or equivalent	Nitrile, or, Viton	< 480 minutes.	0,4 / 0,7	Not known	EN 374

8.2.2.3. Respiratory protection

Respiratory protection:

Approved organic vapour respirator. An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Consult a national health and safety authority for further guidance

Respiratory protection			
Device	Filter type	Condition	Standard
Full face mask, with cartridge/filter	Ax	Concentrations exceed max allowed workplace atmospheric concentrations.	EN 14387

8.2.2.4. Thermal hazards

No additional information available

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8.2.3. Environmental exposure controls

Other information:

Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Colour	: Colourless.
Odour	: Hydrocarbon-like.
Odour threshold	: Not available
Melting point	: Not available
Freezing point	: -141 – -87.5 °C Information refers to cis-1,3-pentadiene and trans-1,3-pentadiene
Boiling point	: 42 – 44 °C Information refers to cis-1,3-pentadiene and trans-1,3-pentadiene
Flammability	: Not applicable
Explosive limits	: 2 – 8.3 vol %
Lower explosion limit	: Not available
Upper explosion limit	: Not available
Flash point	: -29 – -28 °C (closed cup) Information refers to cis-1,3-pentadiene and trans-1,3-pentadiene
Auto-ignition temperature	: Not available
Decomposition temperature	: Not available
pH	: Not applicable
Viscosity, kinematic	: Not available
Solubility	: Water: 690 mg/l Ethanol: Miscible Ether: Miscible Acetone: Miscible
Partition coefficient n-octanol/water (Log Kow)	: Not available
Partition coefficient n-octanol/water (Log Pow)	: 2.44
Vapour pressure	: 405 mm Hg (25°C)
Vapour pressure at 50°C	: Not available
Density	: 0.676 g/m ³ (20°C)
Relative density	: Not available
Relative vapour density at 20°C	: 2.35
Particle characteristics	: Not applicable

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Explosion limits : 2 – 8.3 vol %

9.2.2. Other safety characteristics

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No dangerous reactions known under normal conditions of use.

10.2. Chemical stability

Stable at room temperature. May polymerize on exposure to temperature rise. Highly flammable liquid and vapour. Attacks some forms of plastics, rubber, and coatings. May form flammable/explosive vapour-air mixture.

10.3. Possibility of hazardous reactions

Strong oxidizing agents. Halogens. strong oxidants and strong acids. Reducing agents. Attacks some forms of plastics, rubber, and coatings. On burning: release of carbon monoxide - carbon dioxide. lead.

10.4. Conditions to avoid

No flames, no sparks. Eliminate all sources of ignition. Minimize exposure to air. Direct sunlight. Extremely high or low temperatures. Open flame.

10.5. Incompatible materials

Strong oxidizing agents. Halogens. Strong acids and oxidants. Certain plastics, rubbers and coatings. Reducing agents. Strong bases.

10.6. Hazardous decomposition products

On burning: release of carbon monoxide - carbon dioxide. fume. May release flammable gases. Explosive when mixed with oxidizing substances.

SECTION 11: Toxicological information

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

Acute toxicity (oral)	: Harmful if swallowed.
Acute toxicity (dermal)	: Not classified (Based on available data, the classification criteria are not met)

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Acute toxicity (inhalation) : Harmful if inhaled.

Cyclopentene (142-29-0)	
LD50 oral rat	2140 µl/kg
LD50 dermal rabbit	1231 mg/kg
LC50 Inhalation - Rat	> 22.9 mg/l/4h

2-Methyl-2-butene (513-35-9)	
LD50 oral rat	700 – 2600 mg/kg
LD50 dermal rat	> 2000 mg/kg
LC50 Inhalation - Rat [ppm]	> 61000 ppm/4h

Cyclopentane (287-92-3)	
LD50 oral rat	11400 mg/kg
LC50 Inhalation - Rat	> 25.3 mg/l/4h

Cyclopentadiene (542-92-7)	
LD50 oral rat	113 mg/kg
LD50 dermal rabbit	430 mg/kg
LC50 Inhalation - Rat	39 mg/l (Exposure time: 1 h)

Dicyclopentadiene (77-73-6)	
LD50 oral rat	346.5 mg/kg
LD50 dermal rabbit	4380 mg/kg
LC50 Inhalation - Rat	1910 mg/m ³ (Exposure time: 6 h)

n-Pentane (109-66-0)	
LD50 oral rat	> 2000 mg/kg
LD50 dermal rabbit	3000 mg/kg
LC50 Inhalation - Rat	364 g/m ³ (Exposure time: 4 h)
LC50 Inhalation - Rat (Vapours)	364 mg/l Source: ChemIDplus

1,3-Butadiene, 2-methyl- (78-79-5)	
LD50 oral rat	2043 mg/kg
LD50 dermal rat	> 1 ml/kg
LC50 Inhalation - Rat	180 mg/l/4h

Skin corrosion/irritation : Causes skin irritation.
Serious eye damage/irritation : Causes serious eye irritation.
Respiratory or skin sensitisation : Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity : May cause genetic defects.
Carcinogenicity : May cause cancer.

1,3-Butadiene, 2-methyl- (78-79-5)	
IARC group	2B - Possibly carcinogenic to humans

Reproductive toxicity : Suspected of damaging fertility or the unborn child.
STOT-single exposure : May cause drowsiness or dizziness. May cause respiratory irritation.

2-Methyl-2-butene (513-35-9)	
STOT-single exposure	May cause drowsiness or dizziness.

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Cyclopentadiene (542-92-7)	
STOT-single exposure	May cause respiratory irritation.
Dicyclopentadiene (77-73-6)	
STOT-single exposure	May cause respiratory irritation.
n-Pentane (109-66-0)	
STOT-single exposure	May cause drowsiness or dizziness.
STOT-repeated exposure	: Not classified (Based on available data, the classification criteria are not met)
n-Pentane (109-66-0)	
NOAEC (inhalation, rat, vapour, 90 days)	30 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study), Guideline: other., Guideline: EPA OTS 798.2450 (90-Day Inhalation Toxicity), Guideline: other., Guideline: other:
Aspiration hazard	: May be fatal if swallowed and enters airways.
11.2. Information on other hazards	
11.2.1. Endocrine disrupting properties	
No additional information available	
11.2.2. Other information	
Other information	: Likely routes of exposure: ingestion, inhalation, skin and eye
SECTION 12: Ecological information	
12.1. Toxicity	
Ecology - general	: Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.
Hazardous to the aquatic environment, short-term (acute)	: Very toxic to aquatic life.
Hazardous to the aquatic environment, long-term (chronic)	: Very toxic to aquatic life with long lasting effects.
2-Methyl-2-butene (513-35-9)	
LC50 - Fish [1]	4.99 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss [semi-static])
EC50 - Crustacea [1]	3 mg/l (Exposure time: 48 h - Species: Daphnia magna)
Cyclopentane (287-92-3)	
EC50 - Crustacea [1]	10.5 mg/l (Exposure time: 48 h - Species: Daphnia magna)
Dicyclopentadiene (77-73-6)	
LC50 - Fish [1]	11.5 – 17.6 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
LC50 - Fish [2]	23 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus)
EC50 - Crustacea [1]	11 mg/l (Exposure time: 48 h - Species: Daphnia magna)
EC50 96h - Algae [1]	> 100 mg/l (Species: Pseudokirchneriella subcapitata)
n-Pentane (109-66-0)	
LC50 - Fish [1]	9.87 mg/l (Exposure time: 96 h - Species: Oncorhynchus mykiss)
LC50 - Fish [2]	11.59 mg/l (Exposure time: 96 h - Species: Pimephales promelas)
EC50 - Crustacea [1]	9.74 mg/l (Exposure time: 48 h - Species: Daphnia magna)
ErC50 algae	10.7 mg/l Source: EHCA
1,3-Butadiene, 2-methyl- (78-79-5)	
LC50 - Fish [1]	32.5 – 50.15 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])
LC50 - Fish [2]	58.75 – 95.32 mg/l (Exposure time: 96 h - Species: Pimephales promelas [static])
EC50 - Crustacea [1]	140 mg/l (Exposure time: 48 h - Species: Daphnia magna)

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1,3-Butadiene, 2-methyl- (78-79-5)	
EC50 96h - Algae [1]	> 1000 mg/l (Species: Scenedesmus quadricauda)
12.2. Persistence and degradability	
No additional information available	
12.3. Bioaccumulative potential	
Piperylene (102110-15-6)	
Partition coefficient n-octanol/water (Log Pow)	2.44
Bioaccumulative potential	Based on the n-octanol/water partition coefficient accumulation in organisms is not expected.
2-Methyl-2-butene (513-35-9)	
BCF - Fish [1]	(low potential to bioaccumulate)
Cyclopentane (287-92-3)	
Partition coefficient n-octanol/water (Log Pow)	3 (at 25 °C (at pH 7))
Dicyclopentadiene (77-73-6)	
BCF - Fish [1]	(53 dimensionless (edible fraction))
Partition coefficient n-octanol/water (Log Pow)	2.78 (at 25 °C (at pH 7))
n-Pentane (109-66-0)	
Partition coefficient n-octanol/water (Log Pow)	3.45 (at 25 °C (at pH 7))
1,3-Butadiene, 2-methyl- (78-79-5)	
BCF - Fish [1]	(no bioaccumulation expected)
Partition coefficient n-octanol/water (Log Pow)	3.2 – 4.5 (at 20 °C)
12.4. Mobility in soil	
Piperylene (102110-15-6)	
Ecology - soil	Product is volatile. Mobility in soil.
12.5. Results of PBT and vPvB assessment	
Piperylene (102110-15-6)	
This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII	
This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII	
12.6. Endocrine disrupting properties	
No additional information available	
12.7. Other adverse effects	
Additional information	: Avoid release to the environment.
SECTION 13: Disposal considerations	
13.1. Waste treatment methods	
Waste treatment methods	: Can be incinerated according to local regulations. Dispose of contents/container in accordance with licensed collector's sorting instructions.
Product/Packaging disposal recommendations	: Dispose in a safe manner in accordance with local/national regulations.
Additional information	: Do not re-use empty containers. Handle empty containers with care because residual vapours are flammable.
Ecology - waste materials	: Avoid release to the environment. Hazardous waste due to toxicity.

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SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
14.1. UN number or ID number				
UN 3295	UN 3295	UN 3295	UN 3295	UN 3295
14.2. UN proper shipping name				
HYDROCARBONS, LIQUID, N.O.S.	HYDROCARBONS, LIQUID, N.O.S.	Hydrocarbons, liquid, n.o.s.	HYDROCARBONS, LIQUID, N.O.S.	HYDROCARBONS, LIQUID, N.O.S.
Transport document description				
UN 3295 HYDROCARBONS, LIQUID, N.O.S. (1,3- Pentadiene, (E)- ; 1,3- Pentadiene, (Z)- ; Cyclopentene), 3, II, (D/E), ENVIRONMENTALLY HAZARDOUS	UN 3295 HYDROCARBONS, LIQUID, N.O.S. (1,3- Pentadiene, (E)- ; 1,3- Pentadiene, (Z)- ; Cyclopentene), 3, II, MARINE POLLUTANT/ENVIRONME NTALLY HAZARDOUS	UN 3295 Hydrocarbons, liquid, n.o.s. (1,3- Pentadiene, (E)- ; 1,3- Pentadiene, (Z)- ; Cyclopentene), 3, II, ENVIRONMENTALLY HAZARDOUS	UN 3295 HYDROCARBONS, LIQUID, N.O.S. (1,3- Pentadiene, (E)- ; 1,3- Pentadiene, (Z)- ; Cyclopentene), 3, II, ENVIRONMENTALLY HAZARDOUS	UN 3295 HYDROCARBONS, LIQUID, N.O.S. (1,3- Pentadiene, (E)- ; 1,3- Pentadiene, (Z)- ; Cyclopentene), 3, II, ENVIRONMENTALLY HAZARDOUS
14.3. Transport hazard class(es)				
3	3	3	3	3
14.4. Packing group				
II	II	II	II	II
14.5. Environmental hazards				
Dangerous for the environment: Yes	Dangerous for the environment: Yes Marine pollutant: Yes	Dangerous for the environment: Yes	Dangerous for the environment: Yes	Dangerous for the environment: Yes
No supplementary information available				

14.6. Special precautions for user

Special transport precautions : Due to the characteristics of the product and the pressure and temperature conditions that can be reached during the road transport, it is recommended to transport in vehicles that meet the 27D classification defined in IMETRO Ordinance No. 473/2011 / Brazil

Overland transport

Classification code (ADR) : F1
Special provisions (ADR) : 640C
Limited quantities (ADR) : 11
Excepted quantities (ADR) : E2
Packing instructions (ADR) : P001
Mixed packing provisions (ADR) : MP19
Portable tank and bulk container instructions (ADR) : T7
Portable tank and bulk container special provisions (ADR) : TP1, TP8, TP28
Tank code (ADR) : L1.5BN
Vehicle for tank carriage : FL
Transport category (ADR) : 2
Special provisions for carriage - Operation (ADR) : S2, S20
Hazard identification number (Kemler No.) : 33

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Orange plates : 

Tunnel restriction code (ADR) : D/E

Transport by sea

Packing instructions (IMDG) : P001
IBC packing instructions (IMDG) : IBC02
Tank instructions (IMDG) : T7
Tank special provisions (IMDG) : TP1, TP8, TP28
EmS-No. (Fire) : F-E
EmS-No. (Spillage) : S-D
Stowage category (IMDG) : B
Properties and observations (IMDG) : Immiscible with water.
MFAG-No : 128

Air transport

PCA Excepted quantities (IATA) : E2
PCA Limited quantities (IATA) : Y341
PCA limited quantity max net quantity (IATA) : 1L
PCA packing instructions (IATA) : 353
PCA max net quantity (IATA) : 5L
CAO packing instructions (IATA) : 364
CAO max net quantity (IATA) : 60L
Special provisions (IATA) : A3, A224
ERG code (IATA) : 3H

Inland waterway transport

Classification code (ADN) : F1
Special provisions (ADN) : 640C
Limited quantities (ADN) : 1 L
Excepted quantities (ADN) : E2
Carriage permitted (ADN) : T
Equipment required (ADN) : PP, EX, A
Ventilation (ADN) : VE01
Number of blue cones/lights (ADN) : 1

Rail transport

Classification code (RID) : F1
Special provisions (RID) : 640C
Limited quantities (RID) : 1L
Excepted quantities (RID) : E2
Packing instructions (RID) : P001
Mixed packing provisions (RID) : MP19
Portable tank and bulk container instructions (RID) : T7
Portable tank and bulk container special provisions (RID) : TP1, TP8, TP28
Tank codes for RID tanks (RID) : L1.5BN
Transport category (RID) : 2
Colis express (express parcels) (RID) : CE7
Hazard identification number (RID) : 33

14.7. Maritime transport in bulk according to IMO instruments

Not applicable

SECTION 15: Regulatory information

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

15.1.1. EU-Regulations

REACH Annex XVII (Restriction List)

Not listed on REACH Annex XVII

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REACH Annex XIV (Authorisation List)

Not listed on REACH Annex XIV (Authorisation List)

REACH Candidate List (SVHC)

Not listed on the REACH Candidate List

PIC Regulation (Prior Informed Consent)

Not listed on the PIC list (Regulation EU 649/2012)

POP Regulation (Persistent Organic Pollutants)

Not listed on the POP list (Regulation EU 2019/1021)

Ozone Regulation (1005/2009)

Not listed on the Ozone Depletion list (Regulation EU 1005/2009)

Explosives Precursors Regulation (2019/1148)

Contains no substance(s) listed on the Explosives Precursors list (Regulation EU 2019/1148 on the marketing and use of explosives precursors)

Drug Precursors Regulation (273/2004)

Contains no substance(s) listed on the Drug Precursors list (Regulation EC 273/2004 on the manufacture and the placing on market of certain substances used in the illicit manufacture of narcotic drugs and psychotropic substances)

15.1.2. National regulations

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Listed on KECL/KECI (Korean Existing Chemicals Inventory)

Listed on the TCSI (Taiwan Chemical Substance Inventory)

Listed on the NCI (Vietnam - National Chemical Inventory)

Germany

Water hazard class (WGK) : Not classified according to Regulation Governing Systems for Handling Substances Hazardous to Waters (AwSV).

Chemicals Prohibition Ordinance (ChemVerbotsV) : This product is subject to ChemVerbotsV Annex 2 Entry 1. The following requirements must be observed: authorization requirement (according to § 6 paragraph 1 sentence 1), basic requirements for carrying out the delivery (according to § 8 paragraph 1, 3 and 4), identification and documentation (according to § 9 paragraph 1 to 3) and exclusion of the shipping route (according to § 10).

Hazardous Incident Ordinance (12. BImSchV) : Is not subject of the Hazardous Incident Ordinance (12. BImSchV)

Netherlands

SZW-lijst van kankerverwekkende stoffen : Hydrocarbons, C5-rich, dicyclopentadiene-containing is listed

SZW-lijst van mutagene stoffen : Hydrocarbons, C5-rich, dicyclopentadiene-containing is listed

SZW-lijst van reprotoxische stoffen – Borstvoeding : The substance is not listed

SZW-lijst van reprotoxische stoffen –

Vruchtbaarheid

SZW-lijst van reprotoxische stoffen – Ontwikkeling : The substance is not listed

Denmark

Classification remarks : Emergency management guidelines for the storage of flammable liquids must be followed

Danish National Regulations : Young people under 18 years are not allowed to use the product
Pregnant/breastfeeding women working with the product must not be in direct contact with it

15.2. Chemical safety assessment

A chemical safety assessment has been carried out.

SECTION 16: Other information

Indication of changes

Section	Changed item	Change	Comments
2	Hazard identification	Modified	
8	Exposure controls / Personal protection equipment	Modified	
11.1	Information on hazard classes as defined in Regulation (EC) No 1272/2008	Modified	

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Indication of changes			
Section	Changed item	Change	Comments
15	Regulatory information	Modified	

Abbreviations and acronyms:	
ACGIH	ACGIH (American Conference of Government Industrial Hygienists)
CLP	CLP - Classification, Labelling and Packaging
EC	EC - European Community
EEC	EEC - European Economic Community
GHS	GHS - Globally Harmonised System
PVC	PVC (Polyvinyl chloride).
REACH	REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals
SDS	SDS - Safety Data Sheet

Sources of Key data : Data arise from reference works and literature.

Other information : None.

Full text of H- and EUH-statements:	
Acute Tox. 4 (Inhalation)	Acute toxicity (inhal.), Category 4
Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Aquatic Acute 1	Hazardous to the aquatic environment – Acute Hazard, Category 1
Aquatic Chronic 1	Hazardous to the aquatic environment – Chronic Hazard, Category 1
Asp. Tox. 1	Aspiration hazard, Category 1
Carc. 1B	Carcinogenicity, Category 1B
Eye Irrit. 2	Serious eye damage/eye irritation, Category 2
Flam. Liq. 2	Flammable liquids, Category 2
H225	Highly flammable liquid and vapour.
H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H340	May cause genetic defects.
H350	May cause cancer.
H361	Suspected of damaging fertility or the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
Muta. 1B	Germ cell mutagenicity, Category 1B
Repr. 2	Reproductive toxicity, Category 2

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Full text of H- and EUH-statements:	
Skin Irrit. 2	Skin corrosion/irritation, Category 2
STOT SE 3	Specific target organ toxicity – Single exposure, Category 3, Narcosis

Full text of use descriptors	
ERC6a	Use of intermediate
ERC6c	Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)
ESVOC SPERC 4.21a.v1	Polymer production: Industrial (SU10)
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC14	Tabletting, compression, extrusion, pelettisation, granulation
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC21	Low energy manipulation and handling of substances bound in/on materials or articles
PROC28	Manual maintenance (cleaning and repair) of machinery
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition
PROC4	Chemical production where opportunity for exposure arises
PROC5	Mixing or blending in batch processes
PROC6	Calendering operations
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
SU10	Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
SU3	Industrial uses: Uses of substances as such or in preparations* at industrial sites

Braskem - SDS_EU (modified 221026)

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. It warns that the handling of any chemical substance requires the previous knowledge of its hazards for the user. It is up to the user of the product company providing this SDS to and promote the training of its employees about possible risks come upon of the product. The information contained herein is not absolute, but only general information on the use of the chemical and indication of safety and security measures.

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Annex to the safety data sheet

Product exposure scenario(s)	
ES Type	ES title
Worker	Polymer production

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Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

1. Exposure scenario ES16

Polymer production

ES Ref.: ES16
ES Type: Worker

Use descriptors

PROC1, PROC2, PROC3, PROC4, PROC5, PROC6, PROC8a, PROC8b, PROC14, PROC21, PROC28
ERC6c

2. Operational conditions and risk management measures 0

2.2. Contributing scenario controlling environmental exposure (ERC6c)

Polymer production

ERC6c

Use of monomer in polymerisation processes at industrial site (inclusion or not into/onto article)

Product characteristics

Physical form of product	Liquid
Concentration of substance in product	100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions

No additional information

Risk Management Measures

No additional information

2.1.1. Contributing scenario controlling worker exposure (PROC1) (> 0.1% DCPD & < 0.1% benzene)

General exposures (closed systems). Continuous process. no sampling; indoor

PROC1

Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions

Product characteristics

Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions

Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C
Other given operational conditions affecting workers exposure	Indoor	

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Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No specific measures identified
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

2.1.2. Contributing scenario controlling worker exposure (PROC8b) (> 0.1% DCPD & < 0.1% benzene)

Bulk transfers. Transport. with sample collection; Indoor with LEV.	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 95 % Handle in an enclosing hood with exhaust ventilation. Use high-performance fume cupboard
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Protection effectiveness:	≥ 95 %
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.3. Contributing scenario controlling worker exposure (PROC2) (> 0.1% DCPD & < 0.1% benzene)

polymerization (Bulk and batch). Continuous process. with sample collection; Outdoor, 4 Hours.	
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Other given operational conditions affecting workers exposure	Outdoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Basic. Up to 3 ACH
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No
Technical conditions and measures to control dispersion from source towards the worker	Use in closed, continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Protection effectiveness:	≥ 90 %
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Yes. APF ≥ 10
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.4. Contributing scenario controlling worker exposure (PROC3) (> 0.1% DCPD & < 0.1% benzene)

polymerization (Bulk and batch). Batch process. with sample collection; Outdoor, 1 hour.	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 1 h/day
Other given operational conditions affecting workers exposure	Outdoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Basic. Up to 3 ACH
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No
Technical conditions and measures to control dispersion from source towards the worker	Closed systems. Batch process. With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Protection effectiveness:	≥ 90 %
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Yes. APF ≥ 10
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.5. Contributing scenario controlling worker exposure (PROC3) (> 0.1% DCPD & < 0.1% benzene)

polymerization (Bulk and batch). Batch process. with sample collection. elevated temperature; Indoor with LEV.	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 40 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Closed systems. Batch process. With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	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.

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection: Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. Protection effectiveness:	≥ 90 %
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.6. Contributing scenario controlling worker exposure (PROC3) (> 0.1% DCPD & < 0.1% benzene)

Finishing operations. Batch process. with sample collection; Outdoor, 1 hour.	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 1 h/day
Other given operational conditions affecting workers exposure	Outdoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Basic. Up to 3 ACH
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No
Technical conditions and measures to control dispersion from source towards the worker	Closed systems. Batch process. With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Yes. APF ≥ 10
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.7. Contributing scenario controlling worker exposure (PROC4) (> 0.1% DCPD & < 0.1% benzene)

Intermediate polymer storage. 5%, Local exhaust ventilation.	
PROC4	Chemical production where opportunity for exposure arises

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	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.
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemically resistant gloves conforming to EN374 with basic employee training
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.8. Contributing scenario controlling worker exposure (PROC3) (> 0.1% DCPD & < 0.1% benzene)

Addition and stabilisation. 5%, Local exhaust ventilation.	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Closed systems. Batch process. With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.9. Contributing scenario controlling worker exposure (PROC5) (> 0.1% DCPD & < 0.1% benzene)

Mixing in containers. Batch process; 5%, Local exhaust ventilation.	
PROC5	Mixing or blending in batch processes

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	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.
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemically resistant gloves conforming to EN374 with basic employee training
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.10. Contributing scenario controlling worker exposure (PROC6) (> 0.1% DCPD & < 0.1% benzene)

Pelletizing. Extrusion and masterbatching; 5%, Local exhaust ventilation.	
PROC6	Calendering operations

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.11. Contributing scenario controlling worker exposure (PROC14) (> 0.1% DCPD & < 0.1% benzene)

Pelletizing; 5%, Local exhaust ventilation.	
PROC14	Tabletting, compression, extrusion, pelettisation, granulation

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	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.
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemically resistant gloves conforming to EN374 with basic employee training
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.12. Contributing scenario controlling worker exposure (PROC8b, PROC21) (> 0.1% DCPD & < 0.1% benzene)

Pelletisation and pellet screening. (Open systems). Rework of articles; 5%, Local exhaust ventilation.	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities
PROC21	Low energy manipulation and handling of substances bound in/on materials or articles

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Enhanced general ventilation (5-10 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 95 % Handle in an enclosing hood with exhaust ventilation. Use high-performance fume cupboard

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.13. Contributing scenario controlling worker exposure (PROC3) (> 0.1% DCPD & < 0.1% benzene)

Bulk transfers. Continuous process. with sample collection; 5%, Local exhaust ventilation.	
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Closed systems. Batch process. With occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemically resistant gloves conforming to EN374 with basic employee training
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.14. Contributing scenario controlling worker exposure (PROC8b) (> 0.1% DCPD & < 0.1% benzene)

Transport.with sample collection; 5%, Local exhaust ventilation.	
PROC8b	Transfer of substance or mixture (charging and discharging) at dedicated facilities

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 8 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 95 % Handle in an enclosing hood with exhaust ventilation. Use high-performance fume cupboard

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 90 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.15. Contributing scenario controlling worker exposure (PROC8a, PROC28) (> 0.1% DCPD & < 0.1% benzene)

Equipment maintenance. Local exhaust ventilation.	
PROC8a	Transfer of substance or mixture (charging and discharging) at non-dedicated facilities
PROC28	Manual maintenance (cleaning and repair) of machinery

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 100 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 4 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation. Effectiveness inhalation:	≥ 90 % Yes. Specifically designed fixed capturing hood, on tool extraction or enclosing hoods. LEV has been added to equate to the SOP. Drain down and flush system prior to equipment break-in or maintenance.
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	<p>≥ 95 %</p> <p>Chemically resistant gloves conforming to EN374 with basic employee training</p>
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	Yes. APF ≥ 10
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

2.1.16. Contributing scenario controlling worker exposure (PROC1, PROC2) (> 0.1% DCPD & < 0.1% benzene)

Storage. With occasional controlled exposure; 5%, 1 hour.	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Product characteristics	
Physical form of product	Liquid
Concentration of substance in product	≤ 5 %
Vapour pressure	405 mm Hg
Vapour pressure	Liquid, vapour pressure 0.5 - 10 kPa at Standard Temperature and Pressure

Operational conditions		
Frequency and duration of use	Duration of activity	≤ 1 h/day
Other given operational conditions affecting workers exposure	Indoor	
Other given operational conditions affecting workers exposure	Operating temperature	≤ 20 °C

Risk Management Measures		
Technical conditions and measures to control dispersion from source towards the worker	Local exhaust ventilation	No
Technical conditions and measures to control dispersion from source towards the worker	Occupational Health and Safety Management System:	Advanced
Technical conditions and measures to control dispersion from source towards the worker	Use in closed, continuous process with occasional controlled exposure	
Technical conditions and measures to control dispersion from source towards the worker	General ventilation	Good general ventilation (3-5 air changes per hour)
Organisational measures to prevent/limit releases, dispersion and exposure	General measures (carcinogens)	<p>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.</p> <p>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.</p> <p>Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures.</p> <p>Consider the need for risk based health surveillance.</p>

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Risk Management Measures		
Conditions and measures related to personal protection, hygiene and health evaluation	Eye / face protection	No
Conditions and measures related to personal protection, hygiene and health evaluation	Dermal Protection:	≥ 90 % Chemically resistant gloves conforming to EN374 with basic employee training
Conditions and measures related to personal protection, hygiene and health evaluation	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 problems that may develop	
Conditions and measures related to personal protection, hygiene and health evaluation	Respiratory protection:	No
Conditions and measures related to personal protection, hygiene and health evaluation	General measures (eye irritants)	Use suitable eye protection. Avoid direct contact with released material

3. Exposure estimation and reference to its source

3.1. Health

Long-term - systemic effects						
DNEL			Inhalation: 2.31 mg/m ³ Dermal: 0.95 mg/kg bodyweight/day			
Contributing scenario	inhalation exposure	RCR	dermal exposure	RCR	Sum RCR	Assessment method
PROC1 (> 0.1% DCPD & < 0.1% benzene)	0.038 mg/m ³	0.016	0.0034 mg/kg bw/day	< 0.01	< 0.026	
PROC8b (> 0.1% DCPD & < 0.1% benzene)	0.412 mg/m ³	0.178	0.686 mg/kg bw/day	0.722	0.9	
PROC2 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.137 mg/kg bw/day	0.144	0.244	
PROC3 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.069 mg/kg bw/day	0.073	0.173	
PROC3 (> 0.1% DCPD & < 0.1% benzene)	1.65 mg/m ³	0.714	0.069 mg/kg bw/day	0.073	0.787	
PROC3 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.069 mg/kg bw/day	0.073	0.173	
PROC4 (> 0.1% DCPD & < 0.1% benzene)	0.385 mg/m ³	0.167	0.137 mg/kg bw/day	0.144	0.311	

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Long-term - systemic effects						
PROC3 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.014 mg/kg bw/day	0.015	0.115	
PROC5 (> 0.1% DCPD & < 0.1% benzene)	0.165 mg/m ³	0.071	0.274 mg/kg bw/day	0.289	0.36	
PROC6 (> 0.1% DCPD & < 0.1% benzene)	0.165 mg/m ³	0.071	0.549 mg/kg bw/day	0.578	0.649	
PROC14 (> 0.1% DCPD & < 0.1% benzene)	0.165 mg/m ³	0.071	0.069 mg/kg bw/day	0.073	0.144	
PROC8b, PROC21 (> 0.1% DCPD & < 0.1% benzene)	0.193 mg/m ³	0.083	0.274 mg/kg bw/day	0.289	0.372	
PROC3 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.014 mg/kg bw/day	0.015	0.115	
PROC8b (> 0.1% DCPD & < 0.1% benzene)	0.193 mg/m ³	0.083	0.274 mg/kg bw/day	0.289	0.372	
PROC8a, PROC28 (> 0.1% DCPD & < 0.1% benzene)	0.231 mg/m ³	0.1	0.686 mg/kg bw/day	0.722	0.822	
PROC1, PROC2 (> 0.1% DCPD & < 0.1% benzene)	0.154 mg/m ³	0.067	0.027 mg/kg bw/day	0.029	0.096	

Local - Inhalation					
DNEL			Acute: 160.23 mg/m ³ Long-term: 2.31 mg/m ³		
Contributing scenario	Acute	RCR	Long term	RCR	Assessment method
PROC1 (> 0.1% DCPD & < 0.1% benzene) X	0.154 mg/m ³	< 0.01	0.038 mg/m ³	0.016	
PROC8b (> 0.1% DCPD & < 0.1% benzene) X	1.65 mg/m ³	0.01	0.412 mg/m ³	0.178	
PROC2 (> 0.1% DCPD & < 0.1% benzene) X	0.154 mg/m ³	< 0.01	0.231 mg/m ³	0.1	
PROC3 (> 0.1% DCPD & < 0.1% benzene) X	4.62 mg/m ³	0.029	0.231 mg/m ³	0.1	

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

Local - Inhalation					
PROC3 (> 0.1% DCPD & < 0.1% benzene) X	6.6 mg/m ³	0.041	1.65 mg/m ³	0.714	
PROC3 (> 0.1% DCPD & < 0.1% benzene) X	4.62 mg/m ³	0.029	0.231 mg/m ³	0.1	
PROC4 (> 0.1% DCPD & < 0.1% benzene) X	1.542 mg/m ³	< 0.01	0.385 mg/m ³	0.167	
PROC3 (> 0.1% DCPD & < 0.1% benzene) X	0.924 mg/m ³	< 0.01	0.231 mg/m ³	0.1	
PROC5 (> 0.1% DCPD & < 0.1% benzene) X	0.66 mg/m ³	< 0.01	0.165 mg/m ³	0.071	
PROC6 (> 0.1% DCPD & < 0.1% benzene) X	0.66 mg/m ³	< 0.01	0.165 mg/m ³	0.071	
PROC14 (> 0.1% DCPD & < 0.1% benzene) X	0.66 mg/m ³	< 0.01	0.165 mg/m ³	0.071	
PROC8b, PROC21 (> 0.1% DCPD & < 0.1% benzene) X	0.77 mg/m ³	< 0.01	0.193 mg/m ³	0.083	
PROC3 (> 0.1% DCPD & < 0.1% benzene) X	0.924 mg/m ³	< 0.01	0.231 mg/m ³	0.1	
PROC8b (> 0.1% DCPD & < 0.1% benzene) X	0.77 mg/m ³	< 0.01	0.193 mg/m ³	0.083	
PROC8a, PROC28 (> 0.1% DCPD & < 0.1% benzene) X	1.54 mg/m ³	< 0.01	0.231 mg/m ³	0.1	
PROC1, PROC2 (> 0.1% DCPD & < 0.1% benzene) X	3.08 mg/m ³	0.019	0.154 mg/m ³	0.067	

3.2. Environment

Information for contributing exposure scenario	
2.2	Exposure assessment and risk characterisation are not required

Piperylene

Annex to the safety data sheet: Exposure scenario

CAS-No.: 102110-15-6 Product form: Substance Physical state: Liquid Substance type: UVCB

4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the ES

4.1. Health

Guidance - Health	Estimated workplace exposures are not expected to exceed DNELs when the identified risk management measures are adopted. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
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4.2. Environment

Guidance - Environment	Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures. Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination. Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination
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Additional good practice advice beyond the REACH CSA

No data available