Safety Data Sheet(SDS)

According to Regulation (EU) No. 2020/878

Version : 3-1

Revision date : 01-06-2026

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

1.1. Product identifier

Product identifier : PG_PYROLYSIS_GASOLINE

Other means of identification : No data

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

○ Relevant identified uses

1.Raw materials and intermediates, Fuels and additives

○ Uses advised against

Use for recommended use only
Do not use it for weapons manufacturing and related purposes.

1.3. Details of the supplier of the safety data sheet

○ Seller

Company name : Lotte Daesan Petrochem Corporation
Address : 82 Dokgot 1-ro, Daesan-eup, Seosan-si, Chungcheongnam-do
Telephone number : +82-41-689-5114
Fax number : +82-41-689-5985
Email : www.ldpc.co.kr (contact)

1.4. Emergency telephone number

Emergency phone number : (Control Room) +82-41-689-5119
Opening hours : 08:30~17:30 (GMT+9)
Other comments(e.g. language(s) of the phone service) : English

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

- Flammable liquids Category 2
- Acute toxicity(Oral) Category 3
- Acute toxicity(Dermal) Category 3
- Acute toxicity(Inhalation:Gases) Category 4
- Acute toxicity(Inhalation:Vapours) Category 3
- Acute toxicity(Inhalation:Dust/mist) Category 4
- Skin corrosion/irritation Category 2
- Serious eye damage/eye irritation Category 2
- Skin sensitization Category 1
- Carcinogenicity Category 1A

- Germ cell mutagenicity Category 1B
- Reproductive toxicity Category 2
- Specific target organ toxicity - single exposure Category 3(Narcotic effects)
- Specific target organ toxicity - repeated exposure Category 1
- Aspiration hazard Category 1
- Hazardous to the aquatic environment, long-term (chronic) Chronic 3

2.2. Label elements

Hazard pictograms

Signal word

- DANGER

Hazard statements

H225 Highly flammable liquid and vapour
H301 Toxic if swallowed
H304 May be fatal if swallowed and enters airways
H311 Toxic in contact with skin
H315 Causes skin irritation
H317 May cause an allergic skin reaction
H319 Causes serious eye irritation
H331 Toxic if inhaled
H332 Harmful if inhaled
H336 May cause drowsiness or dizziness
H340 May cause genetic defects
H350 May cause cancer
H361 Suspected of damaging fertility or the unborn child
H372 Causes damage to organs <or state all organs affected, if known> through prolonged or repeated exposure <state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard>
H412 Harmful to aquatic life with long lasting effects

Precautionary statements

- Prevention

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233 Keep container tightly closed.
P240 Ground and bond container and receiving equipment.
P241 Use only explosion-proof electrical, ventilating, lighting and equipment.
P242 Use non-sparking tools.
P243 Take action to prevent static discharges.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Avoid contact during pregnancy/ while nursing.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P272 Contaminated work clothing should not be allowed out of the workplace.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

- Response

P301+P310 IF SWALLOWED: Call a POISON CENTER / toxins center / physician.

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 IF exposed or concerned: Get medical advice/ attention.

P311 Call a POISON CENTER / toxins center / physician.

P312 Discomfort call a POISON CENTER / toxins center / physician if you feel unwell.

P314 Get medical advice/attention if you feel unwell.

P321 Specific treatment (see supplemental instructions on the administration of antidotes on this label).

P330 Rinse mouth.

P331 Do NOT induce vomiting.

P332+P313 If skin irritation occurs: Get medical advice/ attention.

P333+P313 If skin irritation or rash occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/ attention.

P361+P364 Take off immediately all contaminated clothing and wash it before reuse.

P362+P364 Take off contaminated clothing and wash it before reuse.

P370+P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

- Storage

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P403+P235 Store in a well-ventilated place. Keep cool.

P405 Store locked up.

- Disposal

P501 Discard the contents/containers in accordance with the laws and laws related to waste.

2.3. Other hazards

- No data available

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Substance name	1) CAS No 2) EC No	Classification	1) Index number 2) SCL 3) M-Factor 4) ATE	Content(wt%)
Benzene	1) 71-43-2 2) 200-753-7	Flam. Liq. 2, Skin Irrit. 2, Eye Irrit. 2, Carc. 1A, Muta. 1B, STOT RE 1, Asp. Tox. 1	1) - 2) - 3) - 4) Acute toxicity(Inhalation:Vapours) : 13228.76mg/L	38.02
Toluene	1) 108-88-3 2) 203-625-9	Flam. Liq. 2, Skin Irrit. 2, Repr. 2, STOT SE 3, STOT RE 2, Asp. Tox. 1	1) - 2) - 3) - 4) Acute toxicity(Oral) : 5580mg/kg	15.74
Cyclopentadiene	1) 542-92-7 2) 208-835-4		1) - 2) - 3) - 4) Acute toxicity(Oral) : 113mg/kg, Acute toxicity(Dermal) : 430mg/kg, Acute toxicity(Inhalation:Vapours) : 19.5mg/L	6.92
Styrene	1) 100-42-5 2) 202-851-5	Flam. Liq. 3, Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, Repr. 2, STOT RE 1	1) - 2) - 3) - 4) Acute toxicity(Oral) : 5000mg/kg, Acute toxicity(Inhalation:Vapours) : 11.8mg/L	5.12
Pentane	1) 109-66-0 2) 203-692-4	Flam. Liq. 2, STOT SE 3, Asp. Tox. 1, Aquatic Chronic 2	1) - 2) - 3) - 4) Acute toxicity(Inhalation:Vapours) : 364mg/L	3.57
p-Xylene	1) 106-42-3 2) 203-396-5	Flam. Liq. 3, Acute Tox. 4, Acute Tox. 4, Acute Tox. 4, Acute Tox. 4, Skin Irrit. 2	1) - 2) - 3) - 4) Acute toxicity(Oral) : 3523mg/kg, Acute toxicity(Dermal) : 12126mg/kg, Acute toxicity(Inhalation:Gases) : 4550ppm, Acute toxicity(Inhalation:Vapours) : 25.713mg/L	3.28
Dicyclopentadiene	1) 77-73-6 2) 201-052-9	Flam. Liq. 2, Acute Tox. 4, Acute Tox. 4, Skin Irrit. 2, Eye Irrit. 2, STOT SE 3, Aquatic Chronic 2	1) - 2) - 3) - 4) Acute toxicity(Oral) : 512mg/kg, Acute toxicity(Inhalation:Vapours) : 1.972mg/L	3.05

Isoprene	1) 78-79-5 2) 201-143-3	Flam. Liq. 1, Carc. 1B, Muta. 2, Aquatic Chronic 3	1) - 2) - 3) - 4) Acute toxicity(Oral) : 2125mg/kg, Acute toxicity(Inhalation:Vapours) : 180mg/L	3
cis,trans-Hexa-1,4-diene	1) 592-45-0 2) 209-756-8		1) - 2) - 3) - 4) -	2.86
Indene	1) 95-13-6 2) 202-393-6		1) - 2) - 3) - 4) Acute toxicity(Inhalation:Vapours) : 14mg/L	1.91
Cyclized cis-1,4-polyisoprene	1) 68441-13-4 2) -		1) - 2) - 3) - 4) -	1.89
Cumene	1) 98-82-8 2) 202-704-5	Flam. Liq. 3, Carc. 1B, STOT SE 3, Asp. Tox. 1, Aquatic Chronic 2	1) - 2) - 3) - 4) Acute toxicity(Oral) : 2910mg/kg, Acute toxicity(Dermal) : 10600mg/kg, Acute toxicity(Inhalation:Vapours) : 11313.71mg/L	1.89
Hexane	1) 110-54-3 2) 203-777-6	Flam. Liq. 2, Skin Irrit. 2, Repr. 2, STOT SE 3, STOT RE 1, STOT RE 2, Asp. Tox. 1, Aquatic Chronic 2	1) - 2) - 3) - 4) Acute toxicity(Inhalation:Vapours) : 259.354mg/L	1.68
α-Methylstyrene	1) 98-83-9 2) 202-705-0	Flam. Liq. 3, Eye Irrit. 2, STOT SE 3, Aquatic Chronic 2	1) - 2) - 3) - 4) Acute toxicity(Oral) : 4900mg/kg, Acute toxicity(Dermal) : 14560mg/kg, Acute toxicity(Inhalation:Vapours) : 27.99mg/L	1.59
Butane	1) 106-97-8 2) 203-448-7	Flam. Gas 1A, Press. Gas (Comp.)	1) - 2) - 3) - 4) -	1.35
2,3-Dimethylpent-1-ene	1) 3404-72-6 2) 222-285-2		1) - 2) - 3) - 4) -	1.29

Ethylbenzene	1) 100-41-4 2) 202-849-4	Flam. Liq. 2, Acute Tox. 4, STOT RE 2, Asp. Tox. 1	1) - 2) - 3) - 4) Acute toxicity(Oral) : 3500mg/kg, Acute toxicity(Inhalation:Vapours) : 4000mg/L	1.29
2-Methylbut-1-ene	1) 563-46-2 2) 209-250-7		1) - 2) - 3) - 4) -	1.19
Octane	1) 111-65-9 2) 203-892-1	Flam. Liq. 2, Skin Irrit. 2, STOT SE 3, Asp. Tox. 1, Aquatic Acute 1, Aquatic Chronic 1	1) - 2) - 3) - 4) -	1.08
Methyl cyclopentane	1) 96-37-7 2) 202-503-2		1) - 2) - 3) - 4) -	1.03
1-Pentene	1) 109-67-1 2) 203-694-5		1) - 2) - 3) - 4) Acute toxicity(Inhalation:Vapours) : 11mg/L	0.98
Methylcyclohexane	1) 108-87-2 2) 203-624-3	Flam. Liq. 2, Skin Irrit. 2, STOT SE 3, Asp. Tox. 1, Aquatic Chronic 2	1) - 2) - 3) - 4) -	0.58
Cyclopentane	1) 287-92-3 2) 206-016-6	Flam. Liq. 2, Aquatic Chronic 3	1) - 2) - 3) - 4) -	0.46
Cyclopentene	1) 142-29-0 2) 205-532-9		1) - 2) - 3) - 4) -	0.23

SECTION 4: First aid measures

4.1. Description of first aid measures

- 4.1.1. Eye contact
  - In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
  - Seek immediate medical assistance.
- 4.1.2. Skin contact
  - For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
  - In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
  - For minor skin contact, avoid spreading material on unaffected skin.
  - In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
  - Remove and isolate contaminated clothing and shoes.
  - Wash skin with soap and water.
  - Seek immediate medical assistance.
- 4.1.3. Inhalation

- Administer oxygen if breathing is difficult.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- Give artificial respiration if victim is not breathing.
- Keep victim warm and quiet.
- Move to fresh air.

○ 4.1.4. If swallowed

- Seek immediate medical assistance.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

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

- No data available

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

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Exposures require specialized first aid with contact and medical follow-up .

SECTION 5: Firefighting measures

5.1. Extinguishing media

○ Suitable extinguishing media

- For mixtures containing alcohol or polar solvent: Alcohol-resistant foam.
- Direct water.
- CO2.
- Dry chemical.
- Use dry sand or earth to smother fire.
- Regular foam.
- High-pressure water.
- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.
- Water spray.

○ Unsuitable extinguishing media

- Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

- Vapor explosion hazard indoors, outdoors or in sewers.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Can decompose at high temperatures forming toxic gases.
- Can form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- May violently polymerize and result in fire and explosion.
- Runoff may create fire or explosion hazard.
- Some may burn but none ignite readily.

5.3. Advice for firefighters

- Move containers from fire area if you can do it without risk.
- Rescuers should put on appropriate protective gear.
- Substance may be transported hot.
- Substance may be transported in a molten form.
- Cautions ; Most of liquids are lighter than water.
- Dike fire-control water for later disposal; do not scatter the material.
- Evacuate area and fight fire from a safe distance.
- Fire involving Tanks: ALWAYS stay away from tanks engulfed in fire.
- Fire involving Tanks: Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- Fire involving Tanks: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment
  - The wearing of suitable protective equipment to prevent any contamination of skin, eyes and personal clothing.
- Emergency procedures
  - Removal of ignition sources, provision of sufficient ventilation.

6.1.2. For emergency responders

- Wear protective equipment and keep unprotected persons away.
- Avoid dust formation.

6.2. Environmental precautions

- Keep out of waterways.
- Prevent entry into waterways, sewers, basements or confined areas.

6.3. Methods and material for containment and cleaning up

6.3.1. For containment

- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

6.3.2. For cleaning up

- Clear spills immediately.
- Don't use a brush or compressed air for cleaning surfaces or clothing.

6.3.3. Other information

- Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.
- Absorb the liquid and scrub the area with detergent and water.
- Dike and collect water used to fight fire.
- Large Spill: Dike far ahead of liquid spill for later disposal.
- Small Spill: Absorb with earth, sand or other non-combustible material and transfer to containers for later

- disposal.
- Reduce airborne dust and prevent scattering by moistening with water.
- Use clean non-sparking tools to collect absorbed material.
- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

6.4. Reference to other sections

- Section 8 (protective equipment), section 13 (disposal instructions)

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Loosen closure cautiously before opening.
- Measure atmospheric oxygen concentration and ventilate the area during the operation since low-closed area can cause oxygen deficiency.
- Please note that materials and conditions to be avoided.
- Use care in handling/storage.
- Use only in a well-ventilated area.
- All equipment used when handling the product must be grounded.
- Avoid breathing vapors from heated material.
- Avoid prolonged or repeated contact with skin.
- Caution: Heat.
- CAUTION: High temperature.
- Do not enter storage area unless adequately ventilated.
- DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION;.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Handling refer to engineering control/personal protection section.

7.2. Conditions for safe storage, including any incompatibilities

- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Keep away from food and drinking water.

7.3. Specific end use(s)

- See section 1 for recommended use.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Components	Occupational Exposure	ACGIH regulations	Biological limit values	DNEL/DMEL	PNEC-Values

Benzene	0.2 ppm TWA (limit value after 5 April 2026); 0.5 ppm TWA (limit value from 5 April 2024 until 5 April 2026); 1 ppm TWA (limit value until 5 April 2024); 0.66 mg/m3 TWA (limit value after 5 April 2026); 1.65 mg/m3 TWA (limit value from 5 April 2024 until 5 April 2026); 3.25 mg/m3 TWA (limit value until 5 April 2024)	0.02 ppm TWA	15 (Methyl Chloroform in Endexhaed Air, Prior to Last Shift of Workweek) 10mg / L (Trichloroacetic Acid in Urine, End of Workweek)	No data available	No data available
Toluene	50 ppm TWA; 192 mg/m3 TWA 100 ppm STEL; 384 mg/m3 STEL	20 ppm TWA	0.02 mg / l medium: blood time: prior to last shift of workweek parameter: Toluene; 0.03 mg / l Medium: Uric Time: End of Shift Parameter: Toluene; 0.3 mg / g Creatinine Medium: Urine Time: End of Shift Parameter: Ocresol with Hydrolysis (Background)	No data available	No data available
Cyclopentadiene	No data available	0.5 ppm TWA (listed under Dicyclopentadiene) 1 ppm STEL (listed under Dicyclopentadiene)	No data available	No data available	No data available
Styrene	No data available	10 ppm TWA 20 ppm STEL	400 mg / g Creatinine Medium: Urine Time: End of Shift Parameter: Mandelic Acid Plus Phenylglyoxylic Acid (Nonspecific); 40 µg / l Medium: Urine Time: End of Shift Parameter: Styrene	No data available	No data available
Pentane	1000 ppm TWA; 3000 mg/m3 TWA	1000 ppm TWA (listed under Pentane, all isomers)	No data available	No data available	No data available

p-Xylene	50 ppm TWA; 221 mg/m3 TWA 100 ppm STEL; 442 mg/m3 STEL	20 ppm TWA	No data available	No data available	No data available
Dicyclopentadiene	No data available	0.5 ppm TWA (including cyclopentadiene) 1 ppm STEL (including cyclopentadiene)	No data available	No data available	No data available
Indene	No data available	5 ppm TWA	No data available	No data available	No data available

Cumene	50 mg/m3 TWA (during exposure monitoring, account should be taken of relevant biological monitoring values as suggested by the Scientific Committee on Occupational Exposure Limits for Chemicals Agents (SCOEL)); 10 ppm TWA (during exposure monitoring, account should be taken of relevant biological monitoring values as suggested by the Scientific Committee on Occupational Exposure Limits for Chemicals Agents (SCOEL)) 250 mg/m3 STEL (during exposure monitoring, account should be taken of relevant biological monitoring values as suggested by the Scientific Committee on Occupational Exposure Limits for Chemicals Agents (SCOEL)); 50 ppm STEL (during exposure monitoring, account should be taken of relevant biological monitoring values as suggested by the Scientific Committee on Occupational Exposure Limits for Chemicals Agents (SCOEL))	5 ppm TWA	No data available	No data available	No data available
Hexane	20 ppm TWA; 72 mg/m3 TWA	50 ppm TWA	No data available	No data available	No data available
α-Methylstyrene	50 ppm TWA; 246 mg/m3 TWA 100 ppm STEL; 492 mg/m3 STEL	10 ppm TWA	No data available	No data available	No data available
Butane	No data available	1000 ppm STEL (explosion hazard, listed under Butane, isomers)	No data available	No data available	No data available

Ethylbenzene	100 ppm TWA; 442 mg/m3 TWA 200 ppm STEL; 884 mg/m3 STEL	20 ppm TWA	0.15 G / G Creatinine Medium: Urine Time: End of Shift Parameter: Sum of Mandelic Acid and Phenylglyoxylic Acid (Nonspecific)	No data available	No data available
Octane	No data available	300 ppm TWA	No data available	No data available	No data available
Methylcyclohexane	No data available	100 ppm TWA	No data available	No data available	No data available
Cyclopentane	No data available	1000 ppm TWA (explosion hazard)	No data available	No data available	No data available

8.2. Exposure controls

8.2.1. Appropriate engineering controls

- Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

8.2.2. Individual protection measures, such as personal protective equipment

○ Eye/face protection

- If the work environment or activity involves dusty conditions, mists or aerosols, wear the appropriate goggles.

○ Skin protection

(i) Hand protection

- Wear chemical safety gloves.

(ii) Other

- No data available

○ Respiratory protection

- If you have a direct contact or exposed to the material, wear the appropriate form of respiratory protection certified.

○ Thermal hazards

- Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

8.2.3. Environmental exposure controls

- Ensure not to cause envirionmental pollution by discharging into rivers or other waterways.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Property name	Values	Source
Physical state	Liquid	
Colour	yellow	
Odour	hydrocarbon-like;characteristic	
Melting point/freezing point	-129 ℃	
Initial boiling point and boiling range(℃)	36℃	
Flammability(solid, gas)	Flammable liquid	
Upper/lower flammability or explosive limits	No data available	
Flash point(℃)	-11 ℃	
Auto ignition temperature	309 ℃	
Decomposition temperature	No data available	
pH	No data available	
Kinematic viscosity(㎟/s, 40℃)	No data available	
Solubility	No data available	
Partition coefficient(n-octanol/water)	No data available	
Vapour pressure	71 hPa	
Density/Relative density	No data available	
Relative Vapour density	No data available	
Particle characteristics	No data available	
Specific gravity	0.83 (15 ℃)	

9.2. Other information

9.2.1. Information with regard to physical hazard classes

Property name	Values	Source
Flammable liquids	Flash point : -11℃, Initial boiling point and boiling range : 36℃	

9.2.2. Other safety characteristics

- No data available

SECTION 10: Stability and reactivity

10.1. Reactivity

- Some may burn but none ignite readily.
- Vapor explosion hazard indoors, outdoors or in sewers.
- Vapors may form explosive mixtures with air.

- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Can decompose at high temperatures forming toxic gases.
- Can form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Fire may produce irritating, corrosive and/or toxic gases.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- May violently polymerize and result in fire and explosion.
- Runoff may create fire or explosion hazard.

10.2. Chemical stability

- Some may burn but none ignite readily.
- Vapor explosion hazard indoors, outdoors or in sewers.
- Vapors may form explosive mixtures with air.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Can decompose at high temperatures forming toxic gases.
- Can form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Fire may produce irritating, corrosive and/or toxic gases.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- May violently polymerize and result in fire and explosion.
- Runoff may create fire or explosion hazard.

10.3. Possibility of hazardous reactions

- Some may burn but none ignite readily.
- Vapor explosion hazard indoors, outdoors or in sewers.
- Vapors may form explosive mixtures with air.
- When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Can decompose at high temperatures forming toxic gases.
- Can form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- Fire may produce irritating and/or toxic gases.
- Fire may produce irritating, corrosive and/or toxic gases.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- May violently polymerize and result in fire and explosion.
- Runoff may create fire or explosion hazard.

10.4. Conditions to avoid

- Heat.
- Ignition source(heat, spark, flame, etc.).

10.5. Incompatible materials

- Combustibles, reducing material.

10.6. Hazardous decomposition products

- Corrosive/toxic fume.
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
- Irritating and/or toxic gas.
- Irritating, corrosive and/or toxic gas.

SECTION 11: Toxicological information

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

○ Acute toxicity

- Acute toxicity(Oral) PRODUCT : Category 3(ATEmix = 123.701mg/kg)

- Hexane
  : LD50 24 ㎖/kg Test species: Rat (OECD TG 401 (15,864 mg/kg in unit conversion))
- p-Xylene
  : LD50 3523 mg/kg Test species: Rat (EU Method B1)
- α-Methylstyrene
  : LD50 4900 mg/kg Experimental species: Rat (approximate value, male rat, Study from 1956)
- Isoprene
  : LD50 2125 mg/kg Test species: Rat
- Cyclopentadiene
  : LD50 113 mg/kg Test species: Rat (mouse LD50 = 800 mg/kg)
- Cyclopentane
  : LD50 >5000 mg/kg Species : Rat (Rat male/female, no mortality, OECD Guideline 423)
- Dicyclopentadiene
  : EU-CLP Classifications (Category 4 : 500mg/kg)
  LD50 512 mg/kg Test species: Rat (rat, male, OECD Guideline 401, GLP)
- Octane
  : LD50 >5000 mg/kg Species : Rat (rat, no mortality, analogous substance CAS No. 540-84-1, OECD TG 401, GLP)
- Pentane
  : LD50 >2000 mg/kg Species : Rat (male/female rat, OECD Guideline 401, GLP)
- Toluene
  : LD50 5580 mg/kg Test species: Rat (EU Method B.1)
- Cumene
  : LD50 2910 mg/kg Test species: Rat
- Benzene
  : LD50 >2000 mg/kg Experimental species: Rat (number of rats, OECD TG 401)
- Ethylbenzene
  : LD50 3500 mg/kg Test species: Rat
- Styrene
  : LD50 5000 mg/kg Species: Rat (ca. (approximately))

- Acute toxicity(Dermal) PRODUCT : Category 3(ATEmix = 406.250mg/kg)

- Hexane
  : LD50 >3350 mg/kg Experimental species: Rabbit
- p-Xylene
  : EU-CLP Classifications (Category 4 : 1100mg/kg)
  LD50 12126 mg/kg Test species: Rabbit (isomer m-xylene)
- α-Methylstyrene
  : LD50 14560 mg/kg Experimental species: Guinea pig (Death in 16mL, Study from 1975)
- Isoprene
  : LD50 >2000 ㎎/kg Experimental species: Rat
- Cyclopentadiene
  : LD50 430 mg/kg Experimental species: Guinea pig
- Dicyclopentadiene

: LD50 >2000 ㎎/kg Experimental species: Rabbit (OECD Guideline 402, GLP, no death)

- Methylcyclohexane

: LD50 >2000 ㎎/kg Experimental species: Guinea pig (OECD Guideline 402)

- Octane

: LD50 >2000 mg/kg Experimental species: Guinea pig (no death, similar substance CAS No. 540-84-1, OECD TG 402, GLP)

- Toluene

: LD50 >5000 mg/kg Experimental species: Rabbit

- Cumene

: LD50 10600 mg/kg Experimental species: Guinea pig

- Benzene

: LD50 >8260 mg/kg Test species: Rabbit ((OECD TG 402))

- Ethylbenzene

: LD50 >20000 mg/kg Test species: Rabbit (OECD Guideline 402 GLP)

- Styrene

: LD50 >2000 ㎎/kg Experimental species: Rat

- Acute toxicity(Inhalation:Gases) PRODUCT : Category 4(ATEmix = 4500.000ppm)

- p-Xylene

: EU-CLP Classifications (Category 4 : 4500ppm)

LC50 4550 ppm 4 hr Experimental species: Rat

- Butane

: LC50 >800000 ppm 15 min Species : Rat (dead, analog CAS No. 74-98-6)

- Acute toxicity(Inhalation:Vapours) PRODUCT : Category 3(ATEmix = 7.875mg/L)

- Hexane

: LC50 259.354 ㎎/ℓ 4 hr Experimental species: Rat (OECD TG 403)

- 1-Pentene

: LC50 11000 ㎎/㎥ 4 hr

- Methyl cyclopentane

: LC50 >20 ㎎/ℓ 4 hr Experimental species: Rat

- p-Xylene

: EU-CLP Classifications (Category 4 : 11mg/L)

LC50 25.713 ㎎/ℓ 4 hr Test species: Rat (EPA OPP 81-3, GLP)

- α-Methylstyrene

: LC50 22.85 ㎎/ℓ 6 hr Experimental species: Rat (Study from 1972)

- Isoprene

: LC50 180 ㎎/ℓ 4 hr Experimental species: Rat (gas standard value applied at a value lower than 90% of the saturated vapor concentration of 725,000ppmV)

- Cyclopentadiene

: LD50 39 ㎎/ℓ 1 hr Test species: Rat (mouse, LC50, 14g/m3, ChemIDplus mouse, LD50, 15mg/L, 1H, HSDB)

- Cyclopentane

: LC50 >25.3 ㎎/ℓ 4 hr Experimental species: Rat (No death, OECD Guideline 403 GLPLC50, 14.35 mg/L, Hazard Assessment Project, Occupational Safety and Health Institute, 2009)

- Dicyclopentadiene

: LC50 1972 ㎎/㎥ 4 hr Species: Rat

- Methylcyclohexane

: LC50 >26.3 ㎎/ℓ 1 hr Species : Mouse

- Octane

: LC50 >24.88 ㎎/ℓ 4 hr Species : Rat (OECD Guideline 403)

- Pentane

: LC50 364 ㎎/ℓ 4 hr Experimental species: Rat

- Toluene

: LC50 >20 ㎎/ℓ Test species: Rat (OECD TG 403)

- Indene

: LC50 14000 mg/㎥ 4 hr Test species: Rat (converted, LC50, 14mg/L, 4H)

- Cumene

: LC50 8000 ppm 8 hr Test species: Rat (converted, LC50, 55.7mg/L, 4H)

- Benzene

: LC50 10000 ppm 7 hr Test species: Rat (OECD TG 403)

- Ethylbenzene

: EU-CLP Classifications (Category 4 : 11mg/L)

LC50 4000 ppm 4 hr Experimental species: Rat (Rat LC50=4000 ppm 4 hr conversion value: 17.8 mg/L(ECHA, HSDB), RD50=1432 ppm 6.2 mg/L; EU CLP harmonic classification 4)

- Styrene

: EU-CLP Classifications (Category 4 : 11mg/L)

LC50 11.8 ㎎/ℓ 4 hr Species: Rat

● Acute toxicity(Inhalation:Dust/mist) PRODUCT : Category 4(ATEmix = 1.500mg/L)

- p-Xylene

: EU-CLP Classifications (Category 4 : 1.5mg/L)

- Dicyclopentadiene

: EU-CLP Classifications (Category 4 : 1.5mg/L)

○ Skin corrosion/irritation PRODUCT : Category 2

- Hexane

: EU-CLP Classifications (Category 2)

Skin irritation test results using rabbits Mild irritation Primary irritation index 1.92 OECD TG 404

- Methyl cyclopentane

: Non-irritating in rabbits

- p-Xylene

: EU-CLP Classifications (Category 2)

Skin irritation test using rabbits EU Method B.4 Result: Moderate irritation with a primary skin irritation index of 3

- α-Methylstyrene

: Results of skin corrosion/irritation test using rabbits showed slight irritation (slight erythema and edema can be observed between 4 and 72 hours)

- Isoprene

: Mild irritation has been reported in humans.

- 2-Methylbut-1-ene

: Causes skin irritation

- Cyclopentane

: As a result of the skin corrosion and irritation test using rabbits (OEC TG404), the primary skin irritation index was 0.67 (similar substances 109-66-0)

- Dicyclopentadiene

: EU-CLP Classifications (Category 2)

As a result of skin corrosion/irritation test using rabbits, reversible erythema and edema occurred, and moderate irritation appeared (erythema index: 2, edema index: 2.3 (OECD Guideline 404, GLP)

- Methylcyclohexane
  : EU-CLP Classifications (Category 2)
  As a result of skin corrosion/irritation test using rabbits, mild irritation was observed that was completely recovered within 72 hours (erythema: 0.5).
- Octane
  : EU-CLP Classifications (Category 2)
  As a result of skin corrosion/irritation test using rabbits, there is irritation that does not recover within 72 hours. Irritation (erythema index = 1, edema index = 0) (similar substance CAS No. 540-84-1) (OECD TG 404, GLP)
- Pentane
  : As a result of skin corrosion/irritation test using rabbits, mild irritation was observed (erythema: 0.5, edema: 0.06) (OECD Guideline 404)
- Toluene
  : EU-CLP Classifications (Category 2)
  As a result of skin irritation test using rabbits, erythema and edema irritation were observed in all 7 animals, and moderate irritation was observed EU Method B4.
- Cumene
  : No irritation was found as a result of skin corrosion/irritation test using rabbits (OECD Guideline 404)
- Cyclopentene
  : Mild irritant in rabbits
- cis,trans-Hexa-1,4-diene
  : Causes skin irritation
- Benzene
  : EU-CLP Classifications (Category 2)
  Result of skin corrosion/irritation test on rabbits, found to be irritating OECD TG 404
- Ethylbenzene
  : Moderate irritation as a result of skin irritation test using rabbits
- Styrene
  : EU-CLP Classifications (Category 2)
  Moderate irritation such as blisters and hair loss on the skin

○ Serious eye damage/eye irritation PRODUCT : Category 2
- Hexane
  : As a result of severe eye damage/irritation test on rabbits, it did not cause irritation.
- Methyl cyclopentane
  : Irritating in rabbits
- p-Xylene
  : Short-term exposure standard: STEL 100 ppm of mixed xylene causes eye and respiratory irritation in humans exposed to it.
- α-Methylstyrene
  : EU-CLP Classifications (Category 2)
  Severe eye damage/irritation test using rabbits showed slight irritation (the overall irritation index was 14 and fully recovered within 120 hours) (Study from 1972)
- Isoprene
  : Mild irritation has been reported in humans. Mildly irritating to rabbits (Hazard and Risk Assessment Project (2008), Institute for Occupational Safety and Health
- 2-Methylbut-1-ene
  : Causes eye irritation

- Cyclopentadiene
  : The substance is irritating to the eyes.
- 2,3-Dimethylpent-1-ene
  : Prob. of SEV Ocular Irritancy = 0.998 (TOPKAT; Ocular Irritancy SEV vs MOD)
- Cyclopentane
  : As a result of severe eye damage/irritation test using rabbits (OECD TG405, GLP), no corneal or iris effects were observed (similar substance 109-66-0).
- Dicyclopentadiene
  : EU-CLP Classifications (Category 2)
Rabbit, eye irritation test: only slight corneal damage (EU CLP Category 2)
- Methylcyclohexane
  : As a result of a severe eye damage/irritation test using rabbits, mild irritation that was completely recovered within 48 hours was observed (conjunctiva: 0.3) (OECD Guideline 405)
- Octane
  : As a result of severe eye damage/irritation test using rabbits, there is irritation that fully recovers within 48 hours. Non-irritant (conjunctival index = 0.67, corneal index = 0, iris index = 0, conjunctival edema index = 0) (similar substance CAS No. 540-84-1) (OECD TG 405, GLP)
- Pentane
  : As a result of a severe eye damage/irritation test using rabbits, mild irritation was observed that completely recovered within 72 hours (conjunctival edema: 0.33, redness: 2.33) (OECD Guideline 405, GLP)
- Toluene
  : As a result of eye irritation test using rabbits, mild irritation was observed and no other effects were observed.
- Butane
  : No irritation as a result of severe eye damage/irritation test
- Cumene
  : Severe eye damage/irritation test using rabbits showed no irritation (OECD Guideline 405)
- Cyclopentene
  : Mild irritant in rabbits
- cis,trans-Hexa-1,4-diene
  : May cause eye irritation
- Benzene
  : EU-CLP Classifications (Category 2)
Eye damage/irritation test results on rabbits, found to be irritating OECD
- Ethylbenzene
  : As a result of eye irritation test in rabbits, there was no slight irritation to the conjunctiva and no corneal damage.
- Styrene
  : EU-CLP Classifications (Category 2)
Slight infection in rabbit eyes, conjunctival irritation effects observed

○ Respiratory sensitization　PRODUCT : Not classified
- No data available

○ Skin sensitization　PRODUCT : Category 1
- Hexane
  : Skin sensitization test using mice did not cause sensitization OECD TG 429
- p-Xylene
  : Mouse Regional Lymph Node Test OECD TG 429 Hypersensitivity
- Cyclopentadiene

: Skin Sensitization: Causes skin allergy, contact dermatitis.

- Cyclopentane

: Result of skin sensitization test using guinea pig (cancer), no sensitization (similar substance CAS No.78-78-4) (OECD Guideline 406, GLP)

- Dicyclopentadiene

: No skin sensitization occurred as a result of skin sensitization test using guinea pigs (OECD Guideline, 406 GLP)

- Methylcyclohexane

: No skin sensitization was observed as a result of skin sensitization test using guinea pigs (OECD Guideline 406, GLP)

- Octane

: Skin sensitization test results using guinea pigs (OECD TG 406), non-sensitizing (similar substances: SBP 100/140)

- Pentane

: No skin sensitization was observed as a result of skin sensitization test using guinea pigs (OECD Guideline 406, GLP)

- Toluene

: As a result of the maximization test using guinea pigs, there was no skin hypersensitivity reaction EU Method B.6, GLP

- Cumene

: Skin sensitization test using guinea pigs showed no irritation (OECD Guideline 406)

- Benzene

: Results of skin sensitization test using mice and guinea pigs, no sensitization

- Styrene

: As a result of maximization test using guinea pigs, hypersensitivity

○ Carcinogenicity PRODUCT : Category 1A

- p-Xylene

: A4 (ACGHI)

- α-Methylstyrene

: 2B (IARC)

Hazard Communication Carcinogens (OSHA)

A3 (ACGHI)

2 (Notification of Ministry of Employment and Labor)

- Isoprene

: EU-CLP Classifications (Category 1B)

2B (IARC)

R (NTP)

1B (EU CLP)

- Toluene

: 3 (IARC)

A4 (ACGHI)

- Butane

: 1A (limited to cases containing 0.1% or more of butadiene) (Notification of Ministry of Employment and Labor)

1A (containing ≥ 0,1% butadiene (203-450-8)) (EU CLP)

- Cumene

: EU-CLP Classifications (Category 1B)

2B (IARC)
R (NTP)
2 (Notification of Ministry of Employment and Labor)
- Benzene
: EU-CLP Classifications (Category 1A)
1 (IARC)
K (NTP)
A1 (ACGHI)
Specially controlled substances (Occupational Safety and Health Act)
1A (Notification of Ministry of Employment and Labor)
1A (EU CLP)
- Ethylbenzene
: 2B (IARC)
A3 (ACGHI)
2 (Notification of Ministry of Employment and Labor)
- Styrene
: 2B (IARC)
R (NTP)
A4 (ACGHI)
2 (Notification of Ministry of Employment and Labor)

○ Germ cell mutagenicity PRODUCT : Category 1B
- Hexane
: Results of bacterial reversion mutation test using in vitro microorganisms, negative regardless of metabolic activation system GLP, OECD Guideline 471 In vivo chromosomal abnormality test results, negative
- Methyl cyclopentane
: negative in vivo mammalian bone marrow micronucleus test
- p-Xylene
: In vitro reversion mutation test using bacteria. OECD TG471 result was negative, in vivo micronucleus test using mouse bone marrow cells OEF 474, GLP result was negative.
- α-Methylstyrene
: Micronucleus test using mammalian (mouse) red blood cells in vivo, positive in females and negative in males (OECD Guideline 474)
- Isoprene
: EU-CLP Classifications (Category 2)
Mutagenicity dominant lethality test and somatic cell in vivo mutagenicity test (micronucleus test) - positive
- Cyclopentane
: Negative in vitro mammalian chromosomal aberration test
- Dicyclopentadiene
: Negative micronucleus test using mammalian red blood cells in vivo (OECD Guideline 474, GLP)
- Octane
: Negative reversion mutation test using microorganisms
- Pentane
: Results of reversion mutation test using in vitro microorganisms were negative regardless of the presence or absence of metabolic activation system (OECD Guideline 471, GLP)
- Toluene
: Result of gene mutation test using mammalian cultured cells in vitro, OECD TG 476, result of reversion mutation test using microorganism EU Method B.13/14, negative regardless of metabolic activation system,

negative in vivo chromosomal aberration test result

- Butane

: In vitro mammalian (human) chromosomal aberration test result was negative regardless of metabolic activation system (OECD Guideline 473, GLP) Negative fruit fly SLRL test result, negative micronucleus test result using mammalian (rat) red blood cells in vivo (OECD Guideline 474, GLP) *EU CLP: 1B (limited to cases containing 0.1% or more of butadiene)

- Cumene

: Negative micronucleus test using mammalian red blood cells in vivo (OECD Guideline 474, GLP)

- Benzene

: EU-CLP Classifications (Category 1B)

Results of reverse mutation test using in vitro microorganisms showed a very weak positive effect. OECD TG 471 Result of reverse mutation test using in vitro microorganisms showed negative effect. OECD TG 471 Result of chromosomal abnormality test using in vitro cultured cells of mammalian species, positive. Shows effectiveness OECD TG 473, OECD TG 479 Results of mammalian red blood cell micronucleus test using rats in vivo, Single low dose = 3.2mg/m3 OECD TG 474 Results of chromosomal abnormality test using mammalian bone marrow cells in vivo, shows positive effect320mg/ m3 OECD TG 475 * Korea Occupational Safety and Health Act Specially controlled substances germ cell mutagenicity * Korea Ministry of Employment and Labor Notice 1B

- Ethylbenzene

: Negative genotoxicity test using mouse lymphoma L5178Y cells, negative chromosomal abnormality test using Chinese hamster Ovary; synthesis;UDS test result negative, OECD TG474, OECD TG486, GLP

- Styrene

: In vitro reversion mutation test using bacteria. OECD TG 471 positive result, in vitro sister chromosome exchange test using mammalian cells. OECD TG 479 positive result, sister chromosome exchange test using in vivo mice positive, rat exposed to C14-styrene by inhalation Quantitative test result of DNA adduct formed in liver, lung and sorted lung cells of mice and liver, positive in cytogenic test using rodents exposed to styrene by inhalation

○ Reproductive toxicity PRODUCT : Category 2

- Hexane

: EU-CLP Classifications (Category 2)

As a result of the acute inhalation toxicity test in rats, testicular tubule atrophy was observed in rats at 5000 ppm, a wide range of testicular lesions that did not recover within the recovery period were observed, and weight gain and decreased food intake were observed. Concomitant (LC50(water)>5000ppm) (OECD Guideline 403) As a result of fetal toxicity/teratogenicity test on mice, a decrease in the weight of the uterus was observed in the 200 and 5000ppm concentration groups, and the number of implantations decreased in the 5000ppm concentration group, At a concentration of 200 ppm, the incidence of intrauterine mortality increased significantly (NOAECmaternal toxicity=1000 ppm)

- p-Xylene

: Inhalation exposure (24 hr/d) study during organ formation in pregnant rats at doses (3,000 mg/m3) that reduced maternal animal feed or reduced serum neutral hormone concentrations, confirmed decreased fetal weight, reduced number of abdominal fetuses, and supernumerary ribs.

- α-Methylstyrene

: As a result of a reproductive toxicity test using rats, neonatal death was observed in the 1000mg/kg group, and a decrease in neonatal weight and a low survival rate were observed (NOEL = 200mg/kg bw/day) (OECD Guideline 422, GLP)

- Cyclopentane
: As a result of a reproductive toxicity test using rats (male/female), salivation, weight loss in females, and decreased progeny survival at high doses were found (similar substance CAS No.110-82-7) (OECD Guideline 416, GLP) No specific symptoms were found as a result of developmental toxicity/teratogenicity test (analogous substance CAS No.109-66-0) (OECD Guideline 414, GLP)
- Dicyclopentadiene
: Total litter loss for both mothers in the 100 mg/kg group during lactation, examination of newborns in the 100 mg/kg group showed lower survival index, lower birth weight and reduced weight gain. The number of live pups for PND 4 and survival index were 16.3/98.9%, 13.4/99.2%, 13.2/100%, and 9.1/66.1% at 0, 4, 20, and 100 mg/Kg/, confirming maternal and offspring NOAEL of 20mg/Kg/day for females and 100mg/Kg/day for offspring (Rat, OECD 422 Screening 28 days and Reproductive Toxicity Study, Mitsubishi Chemical Safety Institute Ltd., Kashima Laboratories)/ dose that shows clear signs of maternal toxicity It is classified as Category 2 reproductive toxicity because embryotoxicity or developmental toxicity occurs in the following
- Methylcyclohexane
: No adverse effects were observed as a result of a combination test of reproductive/developmental toxicity screening and repeated toxicity testing using rats (LOAEL=250 mg/kg bw/day) (OECD TG 422, GLP)
- Octane
: - As a result of inhalation second-generation reproductive toxicity test using rats, food consumption during breastfeeding was significantly reduced. Reduced food consumption during gestation. Hyaline droplet nephropathy and tubular basophilia in males. The number of offspring killed in the high-dose group increased. (NOAEL(reproductive toxicity)=31,680 mg/m³ air (nominal), NOAEL(other: F1, F2, female/male)=10,560 mg/m³ air (nominal), LOAEL(other: F1, F2, female/male) =31,680 mg/m³ air (nominal)) (similar substance: commercial hexane) (OECD TG 416, GLP) - Inhalation fetal developmental toxicity test in rats, maternal weight loss. No other effects (NOAEC (maternal toxicity) = ca. 2,000 ppm, NOAEC (developmental toxicity) > 7 000 ppm) (similar substance: Cyclohexane) (OECD TG 414, GLP)
- Pentane
: No adverse effects were observed as a result of a first-generation reproductive toxicity test in rats (male/female) (NOAEL>= 1 000 mg/kg bw/day) (OECD Guideline 415, GLP)
- Toluene
: EU-CLP Classifications (Category 2)
As a result of a reproductive toxicity test using rats, NOAEC(P) 600ppm (2261mg/m3) at 2000ppm (7537 mg/m3) due to a decrease in sperm count and epididymis.
- Butane
: As a result of a reproductive toxicity test using rats, there were no special abnormalities related to reproduction and development (OECD Guideline 422, GLP).
- Cumene
: As a result of developmental toxicity test using rats, increase in liver, kidney, and adrenal secretion at 500 and 1200 ppm (NOAEL=>= 1 200 ppm) (OECD Guideline 413 , GLP) Teratogenicity/maternal toxicity test results using rabbits Decreased and increased incidence of occupancy wetness and color change in the lungs (NOAEL=2 300 ppm) (OECD Guideline 414 , GLP)
- cis,trans-Hexa-1,4-diene
: No reproductive toxicity
- Benzene
: ○Developmental toxicity: (maternal toxicity) Spontaneous abortion has been observed and reported in rabbits. (Developmental toxicity) When exposed at a concentration of 500ppm for 7hr/day, a decrease in fetal

crown to rump length and delayed growth of the skeleton are reported. In addition, benzene was detected in maternal amniotic fluid and fetal blood when CFLP mice and NZ rabbits were exposed to concentrations of 154 and 308 ppm for 6 to 15 days under 24 HOUR/DAY conditions. At 308 ppm concentration, fetal skeletal delay was observed. As a result of this, it is classified into Category 2 ○ As a result of an inhalational developmental toxicity test using teratogenic rats, no evidence of teratogenicity was observed in the highest aneurysm. NOAEC = 32 mg/m3 air (OECD TG 414, GLP)

- Ethylbenzene

: As a result of the second-generation inhalational reproductive toxicity test using rats (OECD TG416, GLP), no adverse effects related to reproduction or development were observed up to 500ppm. NOEL for parental systemic toxicity was NOEL=100 ppm due to weight loss and increase in liver weight. As a result of an inhalational developmental toxicity test using rats (EOCD TG414, GLP), no teratogenic effects were observed up to 2000ppm. Weak neonatal weight loss at 1000 or 2000 ppm. Maternal toxicity decreased body weight and feed consumption at 1000 and 2000 ppm. NOAEL(teratogenicity)=2000ppm, NOAEL(maternal/developmental toxicity)=500ppm.

- Styrene

: EU-CLP Classifications (Category 2)

Oral: 23, 58, 80, 90, 100, 110 μmol/kg (3.98 to 19.0 mg/kg), intravenous: 11, 17, 23 μmol/kg (1.90 to 3.98 mg/kg) of lactating hamsters As a result of developmental toxicity/teratogenicity test (oral and intravenous injection) at the concentration, maternal toxicity such as death/coma/weight loss was observed at high concentrations after only one exposure for 8 days. increased, the absorption rate was 100 μmol/

○ Specific target organ toxicity single exposure PRODUCT : Category 3(Narcotic effects)

- Hexane

: EU-CLP Classifications (Category 3(Narcotic effects))

Acute inhalation toxicity in humans may result in dizziness or central nervous system depression. Airway stimulation appears Target organ: central nervous system

- Methyl cyclopentane

: Inhalation irritates airways

- p-Xylene

: Dizziness has been reported in humans, and significant arousal, tremors, and anesthetic effects have been reported in experimental animals. When exposed to 100ppm442 mg/㎥ in humans, mild irritation to the eyes and upper respiratory tract and slight central nervous system effects.

- α-Methylstyrene

: EU-CLP Classifications (Category 3(Respiratory tract irritation))

As a result of an acute oral toxicity test using rats, unstable gait and kidney disease were observed, and death occurred in the 16mL group. At autopsy, petechiae in the lungs, gastrointestinal distension, and staining in the liver and spleen (LD50 = 5.915mg/kg bw) , rabbits As a result of an acute dermal toxicity test using , loss of consciousness within 240 minutes, anesthesia within 5 hours, death within 7 hours (mortality = 41600mg/m3 air (8h)) Upper respiratory tract irritation in humans, Lung abnormalities in laboratory animals, ataxia in coordination, weakness, Loss of sensation reported

- Isoprene

: In humans, effects on the central nervous system, reduced respiratory function or consciousness, burning sensation, resolution, dizziness, nausea, shortness of breath, and sore throat have been reported.

- 2-Methylbut-1-ene

: Irritating to airways when inhaled. cause symptoms

- Cyclopentadiene

: Substance causes irritation of respiratory system The substance is irritating to mucous membranes and glomeruli

- Cyclopentane

: As a result of acute oral toxicity test using rats (male/female), no specific symptoms were found (similar substance CAS No.109-66-0) (OECD TG 401, GLP) Acute inhalation toxicity using rats (male/female) As a result of the test, one male died (14 days), hyperactivity disorder was found (first two hours of exposure), lung cancer, and kidney abnormalities were found (OECD TG 403).

- Dicyclopentadiene

: EU-CLP Classifications (Category 3(Respiratory tract irritation))

Rat, 6hr single inhalation exposure test: runny nose, decreased coordination, persistence, clonic convulsions, LC50 284 ppm (male) (4hr 348 ppm), 353 ppm (female) (4hr 432 ppm) (category 1)/ Rat 4hr single Inhalation exposure test: 1,000ppm eye and nose irritation, dyspnoea, decreased coordination, tremor, hyperesthesia, autopsy results, lung, liver, kidney congestion/ Rat single dose oral administration test: distal position, drowsiness, piloerection, decreased respiratory rate, Reddish-brown discoloration around the nose, autopsy findings, pulmonary hemorrhage, hepatocarcinoma, desquamation of gastric epithelium LD50 590 mg/kg (equivalent to Category 2) / Rat Single dermal exposure test: 2,000mg/kg, under occlusion conditions, 24 hours application Stomach, drowsiness, piloerection, ptosis, reddish-brown discoloration around the nose, but the symptoms disappeared after 2 days/ This substance is thought to affect the central nervous system and respiratory tract, and also exhibit anesthetic action. Category 1 (central nervous system, respiratory), Category 3 (narcotic effects), since effects in inhalation exposure studies have been shown at doses in the Category 1 range.

- Methylcyclohexane

: EU-CLP Classifications (Category 3(Narcotic effects))

As a result of an acute inhalation toxicity test using rats and mice, increased activity, hyperactivity, loss of coordination, exhaustion, central nervous system depression, diarrhea, etc. were observed. Effects on the central nervous system were reported. A supine position was observed in mice. Anesthesia in rabbits Action observed Target organ: central nervous system

- Octane

: EU-CLP Classifications (Category 3(Narcotic effects))

Anesthetic effects and convulsions have been reported at high concentrations. Target organs: central nervous system; EU CLP harmonization classification: Category 3 (anesthetic action)

- Pentane

: EU-CLP Classifications (Category 3(Narcotic effects))

As a result of an acute exposure test using mice, loss of consciousness, decreased movement, respiratory arrest, reflex suppression, anesthesia, etc. were observed, changes in the EEG surface of the brain, drowsiness, headache, nose irritation

- Toluene

: EU-CLP Classifications (Category 3(Narcotic effects))

In humans, it acts on the central nervous system, causing fatigue, drowsiness, dizziness, respiratory irritation, excitement, vomiting, central nervous system depression, delirium, and gait abnormalities. Irritating to eyes, nose and throat. Causes anesthesia in laboratory animals. Target organ: central nervous system

- Butane

: As a result of acute inhalation toxicity test using mice, central nervous system depression, rapid and shallow breathing, signs of apnea were observed (LC50(120min) = 1237mg/L air), and acute toxicity test using rabbits showed no toxicity to the eyes.

- Cumene
  : EU-CLP Classifications (Category 3(Respiratory tract irritation))
  As a result of an acute toxicity test using rats, there was a decrease in body weight, but no specific toxicity was reported. Central nervous system effects, liver and kidney effects, leukocyte effects, anesthetic action, and airway irritation were reported.
- cis,trans-Hexa-1,4-diene
  : Irritating airways when inhaled
- Benzene
  : Lung and liver bleeding (Congestion) As a result of inhalation toxicity, the number of T lymphocytes in the spleen and the number of B lymphocytes in the bone marrow also decrease. ※Target organ: respiratory system. central nervous system, hematopoietic system
- Ethylbenzene
  : Causes nervous system effects such as vertigo and airway irritation in laboratory animals.
- Styrene
  : Respiratory system irritation, central nervous system effect, lung irritation Target organ: central nervous system

○ Specific target organ toxicity repeated exposure PRODUCT : Category 1
- Hexane
  : EU-CLP Classifications (Category 1), EU-CLP Classifications (Category 2)
  As a result of repeated-dose oral toxicity test in rats, 2 of the 13.2 mmol/kg and 46.2 mmol/kg concentration groups died immediately after administration, the weight gain decreased as food consumption decreased, testicular epithelial atrophy was observed Axonal edema and axonal myelin encroachment were observed, and neurotoxic toxicity such as atrophy of the nodal myelin was observed. Neurotoxicity such as hindlimb paralysis was observed after administration in the 46.2 mmol/kg concentration group. NOAEL number = 6.6 mmol /kg bw, NOAEL Number of neurological effects = 13.2 mmol/kg bw Subchronic inhalation toxicity in mice: As a result of a 90-day test, the body weight of male subjects at 1000 and 10000 ppm concentration decreased, and the body weight of female subjects at 10000 ppm concentration also decreased. Decreased, fragmented neutrophils in male subjects increased significantly, liver, kidney, and heart weights increased in female subjects.
- Methyl cyclopentane
  : NOAEL 4.47 ㎎/ℓ (Rat) - As a result of repeated inhalation exposure for 13 weeks in experimental animals, no significant toxicological symptoms were observed except for the flexible reaction observed in the highest concentration group (20.21 ㎎/ℓ).
- p-Xylene
  : Effects on the central nervous system
- α-Methylstyrene
  : As a result of repeated oral toxicity test using rats, one animal died in the 1000mg/kg group, salivation, decreased activity, hematuria and hair loss symptoms could be observed, weight gain inhibition observed, GPT increase, urea nitrogen and potassium increase, triglyceride decrease, long-term Observation of weight gain, liver and kidney enlargement, thymus atrophy, testicular atrophy, pulmonary edema, spleen atrophy (NOEL = 40 mg/kg bw/day) (OECD Guideline 422, GLP) (ECHA), repeated inhalation toxicity test using guinea pigs (14 weeks)) result observed an increase in kidney weight, an increase in the degree of accumulation of hyaline droplets in the kidney (NOAEC = 300 ppm) (OECD Guideline 413, GLP)
- Isoprene
  : - NOAEL 20.3 ㎎/ℓ (Rat) - No significant toxicological symptoms were observed as a result of repeated

inhalation exposure for 13 weeks in experimental animals.
- Cyclopentadiene
: As a result of a chronic oral repeated toxicity test in rats, swelling of hepatocytes and kidney cells was found, and negative hematologic effects were reduced in the renal tubular epithelial cells of the central lobule. In humans, allergic asthma, rhinitis, irritable respiratory syndrome, pulmonary tuberculosis , anemia syndrome, asthma, sneezing due to irritation, nasal bleeding, resolution, dyspnea, effects from repeated exposure to acute toxicity do not apply to this category
- Cyclopentane
: As a result of repeated inhalation toxicity test using rats (male/female), no specific symptoms were found (OECD Guideline 413) Specific target organ toxicity (repeated exposure): NOAEL 15.49 ㎎/ℓ (Rat) 13 weeks of repeated inhalation exposure in laboratory animals Results No significant toxicological symptoms were observed.
- Dicyclopentadiene
: Rat repeated dose toxicity/reproductive and developmental toxicity combined test (OECD TG 422): renal lesions in males over 4mg/kg/d (90 days: 2mg/kg/d), 20mg/kg/d (90 days: 9.8mg/kg) /d) or higher male-adrenal gland relative fat droplet increase, male-GOT (AST) and GPT (ALT) of 100 mg/kg/d (90 days: male 48.9 mg/kg/d, female 45.6 mg/kg/d)) increase, liver weight increase, liver enlargement/single-cell necrosis, kidney discoloration/multiple grayish white spots, adrenal enlargement, etc., fat increase in female-adrenal gland counterparts Rat 18-week inhalation toxicity test (7 hours, 5 days/week, vapor) Kidney lesions were observed in males of the 190mg/m3 (0.22mg/L) group, calcifications in the females of the 399mg/m3 (0.47 mg/L) group, and chronic pneumonia and bronchiectasis were observed in males. Effects on male kidneys were specific to male rats. findings of unknown toxicological significance for the fat increase of the adrenal gland relative, and was seen in females in the inhalation test. As needle calcareous was not adopted as an effect in several other evaluations, it was not used as a basis for classification. Therefore, category 2 (respiratory, hepatic)
- Methylcyclohexane
: As a result of a combination test of reproductive/developmental toxicity screening and repeated toxicity testing using rats, no harmful effects were observed other than salivation (LOAEL=250 mg/kg bw/day) (OECD TG 422, GLP)
- Octane
: As a result of repeated-dose inhalation toxicity test in rats (male), no special effect was observed up to the highest concentration (NOAEC>14 000 mg/m³ air (nominal)) (GLP)
- Pentane
: No adverse effects were observed as a result of inhalation toxicity test in rats (NOAEC=20,000mg/m³ air) (OECD Guideline 413, GLP)
- Toluene
: EU-CLP Classifications (Category 2)
90-day repeated oral toxicity test using rats EU method B.26 results of absolute or relative liver weight increase NOAEL 625 mg/kg bw/day 103 weeks inhalation carcinogenicity test using rats OECD TG453, GLP results NOAEC with local toxicity of nasal epithelium 600 ppm2250mg/m3 90-day repeated inhalation toxicity test using rats EU method B.29, GLP result Clinical symptoms, weight change, organ weight brain, heart, lung, male relative testis weight and hematological changes Leukocyte reduction, plasma chollinesterase acitivity decrease As NOAEC 625 ppm2355 mg/m3
- Butane
: As a result of repeated inhalation toxicity test using rats (4 weeks), there were no special abnormalities

other than weight loss (NOAEC = 4000ppm) (OECD Guideline 422, GLP)

- Cumene

: As a result of a repeated toxicity test using rats (exposure 6 hours per day for 13 weeks), the renal proximal tube hypertrophy, proliferation, and glassy drop formation at 500 and 1,200 ppm

- Benzene

: EU-CLP Classifications (Category 1)

In humans, cases of death have been reported due to bone marrow hypoplasia, hyperplasia or cytopenia, hematological toxicity, aplastic anemia, transverse myelitis, frequent headaches, fatigue, sleep and memory disturbances, decreased white and red blood cell counts, and average red blood cell count. Increased volume appears, abnormal morphology of circulating red blood cells and neutrophils in experimental animals, decreased number of spleen nucleated cells, circulating red blood cells and lymphocytes, decreased white blood cell count, decreased bone marrow cell integrity, decreased number of bone marrow pluripotent stem cells, red blood cells, white blood cells Blood cells, lymphocytes, and hematocrit decreased, and average red blood cell volume increased. · As a result of repeated oral developmental toxicity tests using female rats, harmful effects on the vascular system were observed. (NOAEL male = 200 mg/kg bw/day, LOAEL female = 25 mg/kg bw/day) (OECD TG 408, GLP) · Repeated inhalation developmental toxicity test results using female rats, hematological effects, thyroid, bone marrow, spleen , observation of histopathological abnormalities in the ovaries and testes. (NOAEC = 96 mg/kg bw/day) (OECD TG 412,413, GLP) ※Target organ: Vascular system

- Ethylbenzene

: EU-CLP Classifications (Category 2)

13-week repeated oral toxicity test using rats NOAEL=75 mg/kg bw/day OECD TG408, GLP, ECHA 13 weeks using mice based on hematologic changes indicating mild regenerative anemia, increase in liver weight, and changes in centriolobular hepatocyte hypertrophy As a result of repeated inhalation toxicity test, liver and kidney weight increased at 750 ppm 3.55 mg/L or higher, but no other histopathological findings or adverse effects were observed NOAEC=1000 ppm4.74 mg/LOECD Inhalation neurotoxicity using TG413, ECHA rats As a result of repeated inhalation exposure at concentrations of 200-800 ppm for 4 to 13 weeks to confirm OECD TG424, hearing thresholds did not recover even after 8 weeks after cessation of exposure at concentrations above 400 ppm. During the 8-week recovery period, the OHC loss of 200-800ppm increased significantly to 4% and 100%, respectively. LOAEL=200ppm

- Styrene

: EU-CLP Classifications (Category 1)

As a result of repeated oral toxicity test using mice, the effect on epithelial cells at the terminal bronchioles was observed in 3 mice at 100 mg/kg bw/day or more, and the frequency of s-phrase cells in the terminal bronchus significantly increased in the 100 or 200 mg/kg groups NOAEL = 13-week repeated inhalation toxicity test using 10 mg/kg bw/day mice As a result of GLP, 5 animals in the female 150ppm group and 2 mice in the male 200ppm group showed abnormal liver histopathological infection, fibrosis, and hepatocyte loss. In all exposure groups, nasal abnormalities and lung abnormalities were observed at 100ppm or more. NOAEC=0.21 mg/L, 13-week repeated inhalation toxicity test using rats NOAEL=200 ppm for ototoxicity due to hearing loss at a high concentration of 800 ppm

○ Aspiration hazard PRODUCT : Category 1

- Hexane

: EU-CLP Classifications (Category 1)

Aspiration hazard: Hydrocarbon, kinematic viscosity of 20.5 mm2/s or less 40 ℃, inhalation may cause

serious damage to the lungs (chemical swelling) even in small amounts. EU CLP Harmonized Classification Category 1

- p-Xylene

: Aspiration hazard: Hydrocarbon, kinematic viscosity 0.603 mPa s 25℃ If the liquid is swallowed, there is a reported risk of causing chemical pneumonitis due to smoke fumes.

- α-Methylstyrene

: Aspiration hazard: Hydrocarbon, kinematic viscosity of 1.032 mm2/s (20℃)

- Dicyclopentadiene

: Dynamic viscosity: 1-5 mPa s (at 20 ℃), polycyclic hydrocarbon corresponding to kinematic viscosity, but industrial products contain many monocyclic substances (cyclopentadiene)

- Methylcyclohexane

: EU-CLP Classifications (Category 1)

Viscosity: 0.679 mPas hydrocarbons, and the kinematic viscosity is about 679 mPas at 20°C, less than 20.5 mm2/s at 40°C.

- Octane

: EU-CLP Classifications (Category 1)

The risk of chemical pneumonia has been reported. It is a hydrocarbon, and the kinematic viscosity is 0.735 mm2/s EU CLP harmonized classification 1

- Pentane

: EU-CLP Classifications (Category 1)

Viscosity: 0.2224mPa s (25℃) hydrocarbons, and the kinematic viscosity is 0.374 mm2/s at 20℃. /Human Exposure Studies/ Lung Aspiration Causes Chemical Pneumonia or Pulmonary Edema

- Toluene

: EU-CLP Classifications (Category 1)

Aspiration hazard: Hydrocarbon, kinematic viscosity at 40 ℃ 20.5 mm2 / s or less

- Cumene

: EU-CLP Classifications (Category 1)

Aspiration hazard: Hydrocarbon, kinematic viscosity 20.5 mm2/s or less

- Benzene

: EU-CLP Classifications (Category 1)

Risk of chemical pneumonitis if liquid is swallowed. NLM, viscosity 0.609 cP at 25℃

- Ethylbenzene

: EU-CLP Classifications (Category 1)

hydrocarbons. Swallowing of liquid may cause chemical pneumonia by aspiration. Kinematic viscosity 0.64 ㎟/s 25 ℃

- Styrene

: hydrocarbon. Swallowing of liquid may cause chemical pneumonia by aspiration. Kinematic viscosity 0.696 mPa/s 25 °C

11.2. Information on other hazards

11.2.1. Endocrine disrupting properties PRODUCT : Not classified

- Hexane
  Not applicable
- 1-Pentene
  Not applicable
- Methyl cyclopentane
  Not applicable

- p-Xylene
  Not applicable
- Cyclized cis-1,4-polyisoprene
  Not applicable
- α-Methylstyrene
  Not applicable
- Isoprene
  Not applicable
- 2-Methylbut-1-ene
  Not applicable
- Cyclopentadiene
  Not applicable
- 2,3-Dimethylpent-1-ene
  Not applicable
- Cyclopentane
  Not applicable
- Dicyclopentadiene
  Not applicable
- Methylcyclohexane
  Not applicable
- Octane
  Not applicable
- Pentane
  Not applicable
- Toluene
  Not applicable
- Indene
  Not applicable
- Butane
  Not applicable
- Cumene
  Not applicable
- Cyclopentene
  Not applicable
- cis,trans-Hexa-1,4-diene
  Not applicable
- Benzene
  Not applicable
- Ethylbenzene
  Not applicable
- Styrene
  Not applicable

11.2.2. Other information PRODUCT : Not classified

- Hexane
  No other hazards have been identified
- 1-Pentene
  No other hazards have been identified
- Methyl cyclopentane
  No other hazards have been identified

- p-Xylene
  No other hazards have been identified
- Cyclized cis-1,4-polyisoprene
  No other hazards have been identified
- α-Methylstyrene
  No other hazards have been identified
- Isoprene
  No other hazards have been identified
- 2-Methylbut-1-ene
  No other hazards have been identified
- Cyclopentadiene
  No other hazards have been identified
- 2,3-Dimethylpent-1-ene
  No other hazards have been identified
- Cyclopentane
  No other hazards have been identified
- Dicyclopentadiene
  No other hazards have been identified
- Methylcyclohexane
  No other hazards have been identified
- Octane
  No other hazards have been identified
- Pentane
  No other hazards have been identified
- Toluene
  No other hazards have been identified
- Indene
  No other hazards have been identified
- Butane
  No other hazards have been identified
- Cumene
  No other hazards have been identified
- Cyclopentene
  No other hazards have been identified
- cis,trans-Hexa-1,4-diene
  No other hazards have been identified
- Benzene
  No other hazards have been identified
- Ethylbenzene
  No other hazards have been identified
- Styrene
  No other hazards have been identified

SECTION 12: Ecological information

12.1. Toxicity

- Fish PRODUCT : Hazardous to the aquatic environment, long-term (chronic) Chronic 3
  - Hexane
    : EU-CLP Classifications (Chronic 2)

LC50 >1 ㎎/ℓ 48 hr Oryzias latipes (no guideline followed, [More information] ECHA harmonized classification Chronic aquatic environmental hazard Category 2)
- 1-Pentene
  : LC50 12.461 mg/L 96 hr
- Methyl cyclopentane
  : LC50 2.25 mg/L 96 hr
- p-Xylene
  : LC50 2.6 mg/ℓ 96 hr Others (OECD Guideline 203)
- α-Methylstyrene
  : EU-CLP Classifications (Chronic 2)

LC50 2.97 ㎎/ℓ 96 hr Others (Danio rerio, OECD Guideline 203, GLP)
- Isoprene
  : EU-CLP Classifications (Chronic 3)

LC50 75 mg/L 96 hr
- 2-Methylbut-1-ene
  : LC50 3.551 mg/L 96 hr
- 2,3-Dimethylpent-1-ene
  : LC50 2.81 ㎎/ℓ 96 hr (ECOSAR Class: Neutral Organics)
- Cyclopentane
  : EU-CLP Classifications (Chronic 3)

LC50 4.26 ㎎/ℓ 96 hr Oncorhynchus mykiss (Static renewal, analog CAS No.109-66-0, OECD Guideline 203, GLP)
- Dicyclopentadiene
  : EU-CLP Classifications (Chronic 2)

LC50 157 mg/ℓ 96 hr Ictalurus punctatus (Macroinvertebrate and fish toxicity tests followed the recommended bioassay procedures as described in the “Methods for Acute Toxicity Tests with Fish, Macro invertebrates, and Amphibians”)
- Methylcyclohexane
  : EU-CLP Classifications (Chronic 2)

LC50 2.07 mg/ℓ 96 hr Oryzias latipes (semi-static)
- Octane
  : EU-CLP Classifications (Acute 1), EU-CLP Classifications (Chronic 1)

LC50 0.885 ㎎/ℓ 96 hr Others (Fresh water fish, EU CLP harmonized classification 1)
- Pentane
  : EU-CLP Classifications (Chronic 2)

LC50 4.26 ㎎/ℓ 96 hr Oncorhynchus mykiss (semi-static, OECD Guideline 203, GLP)
- Toluene
  : LC50 5.5 mg/L 96 hr Oncorhynchus kistutch
- Butane
  : LC50 27.98 mg/ℓ 96 hr Others (similar CAS no.74-28-5)
- Cumene
  : EU-CLP Classifications (Chronic 2)

LC50 4.7 mg/ℓ 96 hr Other (Cyprinodon variegatus, EPA OTS 797.1400, GLP)
- Cyclopentene
  : LC50 18.259 mg/L 96 hr
- cis,trans-Hexa-1,4-diene
  : LC50 2.873 mg/L 96 hr
- Benzene

: LC50 5.3 mg/ℓ 96 hr Oncorhynchus mykiss (OECD Guideline 203)

- Ethylbenzene

: LC50 5.1 mg/L 96 hr

- Styrene

: LC50 10 ㎎/ℓ 96 hr Pimephales promelas (OECD Guideline 203. GLP)

- Crustaceans PRODUCT : Hazardous to the aquatic environment, long-term (chronic) Chronic 3

- Hexane

: EU-CLP Classifications (Chronic 2)

LC50 21.85 mg/ℓ 48 hr Daphnia magna

- 1-Pentene

: LC50 13.975 mg/L 48 hr

- Methyl cyclopentane

: LC50 6.67 mg/L 48 hr

- p-Xylene

: LC50 3.6 mg/ℓ 24 hr Others (OECD TG 202)

- α-Methylstyrene

: EU-CLP Classifications (Chronic 2)

EC50 1.64 ㎎/ℓ 48 hr Daphnia magna (OECD Guideline 202, GLP)

- Isoprene

: EU-CLP Classifications (Chronic 3)

EC50 3.2 mg/L 48 hr

- 2-Methylbut-1-ene

: LC50 12.342 mg/L 48 hr

- 2,3-Dimethylpent-1-ene

: LC50 2.015 ㎎/ℓ 48 hr (ECOSAR Class: Neutral Organics)

- Cyclopentane

: EU-CLP Classifications (Chronic 3)

LC50 4.659 mg/ℓ 48 hr Other (Daphnia sp.)

- Dicyclopentadiene

: EU-CLP Classifications (Chronic 2)

EC50 4.2 mg/ℓ 48 hr Daphnia pulex (other guideline: ASTM (1980) E728-80)

- Methylcyclohexane

: EU-CLP Classifications (Chronic 2)

EC50 0.326 ㎎/ℓ 48 hr Daphnia magna (semi-static)

- Octane

: EU-CLP Classifications (Acute 1), EU-CLP Classifications (Chronic 1)

EC50 0.18 ㎎/ℓ 48 hr Daphnia magna (EU CLP harmonized classification: Category 1)

- Pentane

: EU-CLP Classifications (Chronic 2)

LC50 9.1 mg/ℓ 48 hr Daphnia magna (static formula)

- Toluene

: EC50 3.78 mg/ℓ 48 hr Ceriodaphnia dubia

- Butane

: LC50 69.43 mg/ℓ 48 hr Others (Daphnia sp., analog CAS no.74-28-5)

- Cumene

: EU-CLP Classifications (Chronic 2)

EC50 2.14 mg/ℓ 48 hr Daphnia magna (OECD Guideline 202, GLP)

- Cyclopentene

: LC50 20.210 mg/ℓ 48 hr Other (Daphinid)

- cis,trans-Hexa-1,4-diene

: LC50 9.103 mg/L 48 hr

- Benzene

: EC50 10 ㎎/ℓ 48 hr Daphnia magna (Water flea toxicity: EC50=20.6ppm, 48h National Institute of Environmental Research OECD TG 202)

- Ethylbenzene

: LC50 1.8 mg/ℓ 48 hr Daphnia magna (Ceriodaphnia dubia NOEC 1.0 mg/L (0.96 mg/L) 7days)

- Styrene

: EC50 4.7 ㎎/ℓ 48 hr Daphnia magna (OECD TG 202, GLP)

- Aquatic algae PRODUCT : Hazardous to the aquatic environment, long-term (chronic) Chronic 3

- Hexane

: EU-CLP Classifications (Chronic 2)

- 1-Pentene

: EC50 9.075 mg/L 96 hr

- Methyl cyclopentane

: EC50 4.44 mg/L 96 hr

- p-Xylene

: EC50 4.06 mg/ℓ 72 hr Others (OECD TG201, GLP)

- α-Methylstyrene

: EU-CLP Classifications (Chronic 2)

ErC50 11.441 ㎎/ℓ 72 hr Others (Desmodesmus subspicatus, OECD Guideline 201, GLP)

- Isoprene

: EU-CLP Classifications (Chronic 3)

- 2-Methylbut-1-ene

: EC50 8.030 mg/L 96 hr

- 2,3-Dimethylpent-1-ene

: EC50 1.938 ㎎/ℓ 96 hr (ECOSAR Class : Neutral Organics)

- Cyclopentane

: EU-CLP Classifications (Chronic 3)

EC50 3.415 mg/ℓ 96 hr Other (green algae)

- Dicyclopentadiene

: EU-CLP Classifications (Chronic 2)

EbC50 27 ㎎/ℓ 72 hr Others (Pseudokirchnerella subcapitata, OECD Guideline 201)

- Methylcyclohexane

: EU-CLP Classifications (Chronic 2)

ErC50 0.134 mg/ℓ 72 hr Others (Pseudokirchneriella subcapitata, static formula)

- Octane

: EU-CLP Classifications (Acute 1), EU-CLP Classifications (Chronic 1)

EC50 0.9 mg/ℓ 72 hr Other (freshwater algae)

- Pentane

: EU-CLP Classifications (Chronic 2)

ErC50 10.7 mg/ℓ 72 hr Selenastrum capricornutum (static formula, OECD Guideline 201, GLP)

- Toluene

: EC50 134 mg/ℓ 3 hr Chlorella vulgaris (EC10 and NOEC: 10 mg/L)

- Butane

: EC50 16.47 mg/ℓ 96 hr Others (Green algea, analog CAS no. 74-84-0)

- Cumene

: EU-CLP Classifications (Chronic 2)

ErC50 2.01 ㎎/ℓ 72 hr Others (Desmodesmus subspicatus, OECD Guideline 201 , GLP)

- Cyclopentene

: EC50 12.981 mg/ℓ 96 hr Others (Green algae)

- cis,trans-Hexa-1,4-diene

: EC50 6.007 mg/L 96 hr

- Benzene

: EC50 29 mg/L 72 hr Selenastrum capricornutum (Selenastrum capricornutum, EC50=32 mg/L 72h, ECHA)

- Ethylbenzene

: EC50 2.6 mg/ℓ 96 hr Other (marine invertebrate)

- Styrene

: EC50 4.9 ㎎/ℓ 72 hr Selenastrum capricornutum (EPA OTS 797.1050, GLP)

12.2. Persistence and degradability

- Degradability PRODUCT : Not classified

- Toluene

: (Not adsorbed to sediment in water, evaporated or biodegraded (BOD: 80%, 20 days))

- Benzene

: (decomposes under anaerobic conditions)

- Biodegradation PRODUCT : Not classified

- Hexane

: 98 % 28 day (similar substance: 64742-49-0 OECD TG 301 F, GLP)

- p-Xylene

: 90% 28 days (OECD TG301F, GLP)

- Cyclized cis-1,4-polyisoprene

: (Considered recalcitrant as there are no useful data on biodegradability)

- α-Methylstyrene

: 21% 28 days (OECD Guideline 301 F, GLP)

- Isoprene

: 2 (%)

- 2,3-Dimethylpent-1-ene

: (Cut-off value = 0.4324 ; recalcitrant (BIOWIN 6))

- Cyclopentane

: 0 % 28 days (CO_2 emission 0% after 28 days, not decomposed in the measurement environment, OECD TG301F, GLP)

- Dicyclopentadiene

: 0 % 28 day (Recalcitrant, OECD TG301F, GLP)

- Methylcyclohexane

: 0% 28 days (OECD Guideline 301 D, GLP)

- Octane

: 70.3% 10 days

- Pentane

: 81% 28 days (OECD Guideline 301 F, GLP)

- Toluene

: 80 % 20 day (biodegradability)

- Butane

: 100 % 385.5 hr (similar CAS No. 74-84-0)

- Cumene

: 2 % 60 day (Recalcitrant)

- Benzene

: 50% 28 days (decomposes under anaerobic conditions (NITE))

- Ethylbenzene

: 80 % ~ 70 % 28 day (ISO 14593 CO2 headspace test, GLP)

- Styrene

: 100% 28 day (ISO DIS 9408 aerobic biodegradation test, GLP)

12.3. Bioaccumulative potential

- n-octanol water partition coefficient PRODUCT : Not classified

- Hexane

: 4 log Kow (20°C, pH=7)

- 1-Pentene

: 2.66 log Kow

- Methyl cyclopentane

: 3.37 log Kow

- p-Xylene

: 3.15 log Kow

- α-Methylstyrene

: 3.48 log Kow

- Isoprene

: 2.3 log Kow

- 2-Methylbut-1-ene

: 2.72 log Kow

- 2,3-Dimethylpent-1-ene

: 3.63 log Kow

- Cyclopentane

: 3 log Kow

- Dicyclopentadiene

: 3.16 log Kow

- Methylcyclohexane

: 3.88 log Kow

- Octane

: 5.15 log Kow

- Pentane

: 3.45 log Kow

- Toluene

: 2.73 log Kow

- Indene

: 2.92 log Kow

- Butane

: 2.89 log Kow

- Cumene

: 3.55 log Kow

- Cyclopentene

: 2.47 log Kow

- cis,trans-Hexa-1,4-diene

: 2.94 log Kow

- Benzene

: 2.13 log Kow

- Ethylbenzene

: 3.15 log Kow

- Styrene
  : 2.95 log Kow

- Bioconcentration factor(BCF) PRODUCT : Not classified
  - Hexane
    : 125
  - 1-Pentene
    : 22
  - Methyl cyclopentane
    : 210
  - α-Methylstyrene
    : 140 to 15 (OECD Guideline 305 C)
  - Isoprene
    : 20
  - 2-Methylbut-1-ene
    : 25
  - 2,3-Dimethylpent-1-ene
    : 115.4
  - Dicyclopentadiene
    : 384
  - Methylcyclohexane
    : 321 ~ 95 (L/kg)
  - Octane
    : 198.7
  - Pentane
    : 171 (predicted)
  - Toluene
    : 90
  - Cumene
    : 35.5
  - Cyclopentene
    : 15.9
  - cis,trans-Hexa-1,4-diene
    : 36.41
  - Benzene
    : 43.2 ~ 5.88 (30fresh water, green algae, 3.5 conger, 4.3 gold fish)
  - Ethylbenzene
    : 1 (BCF)
  - Styrene
    : 74

12.4. Mobility in soil PRODUCT : Not classified
  - Hexane
    : 2187.76 Koc (QSAR)
  - Methyl cyclopentane
    : 1600
  - p-Xylene
    : 540 Koc to 246 Koc
  - 2-Methylbut-1-ene
    : 68
  - 2,3-Dimethylpent-1-ene

: 1,413 (may be adsorbed to soil)
- Benzene
: 134.1 Koc (QSAR)
- Ethylbenzene
: (log koc = 2.41, measured)
- Styrene
: 352 Koc

12.5. Result of PBT and vPvB assessment PRODUCT : Not classified

Not applicable

12.6. Endocrine disrupting properties PRODUCT : Not classified

Not applicable

12.7. Other adverse effects PRODUCT : Not classified

- Hexane
: Not applicable
- 1-Pentene
: Not applicable
- Methyl cyclopentane
: Not applicable
- p-Xylene
: Not applicable
- Cyclized cis-1,4-polyisoprene
: Not applicable
- α-Methylstyrene
: Not applicable
- Isoprene
: Not applicable
- 2-Methylbut-1-ene
: Not applicable
- Cyclopentadiene
: Not applicable
- 2,3-Dimethylpent-1-ene
: Not applicable
- Cyclopentane
: Not applicable
- Dicyclopentadiene
: Not applicable
- Methylcyclohexane
: Not applicable
- Octane
: Not applicable
- Pentane
: Not applicable
- Toluene
: Not applicable
- Indene
: Not applicable
- Butane
: Not applicable
- Cumene

: Not applicable

- Cyclopentene

: Not applicable

- cis,trans-Hexa-1,4-diene

: Not applicable

- Benzene

: Not applicable

- Ethylbenzene

: Not applicable

- Styrene

: Not applicable

SECTION 13: Disposal considerations

13.1. Waste treatment methods

13.1.1. Product / Packaging disposal

- Empty containers should be taken to an approved waste handling site for recycling or disposal.

○ Waste codes / waste designations according to LoW

- No data available

13.1.2. Waste treatment-relevant information

- Disposal according to local regulations.

13.1.3. Sewage disposal-relevant information

- Disposal according to local regulations and avoid release to the environment.

13.1.4. Other disposal recommendations

- No data available

SECTION 14: Transport information

14.1. UN number or ID number : 3295

14.2. UN proper shipping name : HYDROCARBONS, LIQUID, N.O.S.

14.3. Transport hazard class(es) : 3

14.4. Packing group : II

14.5. Environmental hazards : No

14.6. Special precautions for user :

Emergency measures in case of fire : F-E

Emergency measures in the effluent : S-D

14.7. Maritime transport in bulk according to IMO instruments :

Not applicable

- ADR

· Tunnel restriction code : D/E

- IMDG

· Marine pollutant : No

- Air transport(IATA)

· UN No. : 3295

· Proper shipping name : HYDROCARBONS, LIQUID, N.O.S.

· Class or division : 3

· Packing group : II

SECTION 15: Regulatory information

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

15.1.1. EU regulations

- EU - REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances

- Toluene : Use restricted. See item 48.; Use restricted. See item 75.

- p-Xylene : Use restricted. See item 75. (C)

- Cumene : Use restricted. See item 28.; Use restricted. See item 75.

- α-Methylstyrene : Use restricted. See item 75.

- Methylcyclohexane : Use restricted. See item 75.

- Isoprene : Use restricted. See item 28. (D); Use restricted. See item 75. (D)

- Benzene : Use restricted. See item 72.; Use restricted. See item 5.; Use restricted. See item 28.; Use restricted. See item 29.; Use restricted. See item 75. (E)

- Dicyclopentadiene : Use restricted. See item 75.

- Butane : Use restricted. See item 28. (C) (containing >=0.1% Butadiene); Use restricted. See item 29. (C) (containing >=0.1% Butadiene); Use restricted. See item 75.

- Hexane : Use restricted. See item 75.

- Octane : Use restricted. See item 75. (C)

- Styrene : Use restricted. See item 75. (D)

- EU - REACH (1907/2006) - Annex XIV - Substances Subject to Authorization

- Not applicable

15.1.2. Other EU regulations

- EU - Persistent Organic Pollutants (POPs) (2019/1021) - Annex III - Substances Subject to Release Reduction Provisions

- Not applicable

- EU - Persistent Organic Pollutants (POPs) (2019/1021) - Annex I - Substances Subject to Prohibitions

- Not applicable

- EU - Persistent Organic Pollutants (POPs) (2019/1021) - Annex IV - Waste Management - Concentration Limits

- Not applicable

- EU - Persistent Organic Pollutants (POPs) (2019/1021) -Annex V-Waste Management-Maximum Concentration Limits

- Not applicable

- EU - Paints, Varnishes, Vehicle Refinishing Products (2004/42/CE) - Annex II A - WB Phase 1 - VOCs

- Not applicable

- EU - Paints, Varnishes, Vehicle Refinishing Products (2004/42/CE) - Annex II A - WB Phase 2 - VOCs

- Not applicable

- EU - Paints, Varnishes, Vehicle Refinishing Products (2004/42/CE) - Annex II B - Vehicles - VOCs

- Not applicable

- EU - Paints, Varnishes, Vehicle Refinishing Products (2004/42/CE) - Annex II A - SB Phase 1 - VOCs

- Not applicable

- EU - Paints, Varnishes, Vehicle Refinishing Products (2004/42/CE) - Annex II A - SB Phase 2 - VOCs

- Not applicable

- EU - Seveso III Directive (2012/18/EU) - Qualifying Quantities of Dangerous Substances - Lower-Tier Requirements

- Not applicable

- EU - Seveso III Directive (2012/18/EU) - Qualifying Quantities of Dangerous Substances - Higher-Tier Requirements

- Not applicable

- EU - Export and Import Restrictions (649/2012) - Chemicals Subject to Export Notification Procedure

- Benzene : Severe restriction as an industrial chemical for public use (except motor fuels subject to Directive 98/70/EC)

- EU - Export and Import Restrictions (649/2012) - Chemicals and Articles Subject to Export Ban

- Not applicable

- EU - Export and Import Restrictions (649/2012) - Chemicals Subject to the PIC Procedure under the Rotterdam Convention

- Not applicable

- EU - Export and Import Restrictions (649/2012) - Chemicals Qualifying for PIC Notification

- Not applicable

15.2. Chemical safety assessment

- A Chemical Safety Assessment has been carried out.

SECTION 16: Other information

16.1. Key literature references and sources for data

NCIS, KOSHA, Montreal Protocol, ECHA, OECD SIDS, EU IUCLID, HSDB(PubChem), NITE, NTP, ACGIH, IARC, NIOSH, ChemIDplus, EPA, EPI Suite, INCHEM

16.2. Issuing date : 26-12-2022

16.3. Indication of changes

- Revision number : 3-1
- Revision date : 01-06-2026

16.4. Abbreviations and acronyms

ACGIH : American Conference of Governmental Industrial Hygienists
ADR : Agreement Concerning the International Carriage of Dangerous Goods by Road
ATE : The Acute Toxicity Estimate
ECHA : European Chemicals Agency
EPA : United States Environmental Protection Agency
EPI Suite : The Estimation Programs Interface for Windows
EU IUCLID : International Uniform Chemical Information Database
HSDB : Hazardous Substances Data Bank
IARC : International Agency for Research on Cancer
IATA : International Air Transport Association
IMDG : International Maritime Dangerous Goods Codes
INCHEM : Internationally Peer Reviewed Chemical Safety Information
M-Factor : The Multiplication Factor
NIOSH : National Institute of Occupational Safety and Health
NITE : National Institute of Technology and Evaluation(JAPAN)
NTP : National Toxicology Program
SCL : Specific Concentration Limit
OECD SIDS : Organization for Economic Co-operation and Development Screening Information Dataset

For explanation of abbreviations see section 16.

- This substance/mixture contain(s) only ingredients which have been registered, or are exempt from registration, according to Regulation (EC) No. 1907/2006 (REACH).

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