물질안전보건자료
(Material Safety Data Sheet)

Name of the product	KK-ALKYD PRIMER REDDISH BROWN

1. information about chemicals and companies

A. Product name	KK-ALKYD PRIMER REDDISH BROWN
B. Recommended uses and restrictions on use of products	
recommended use of the product	Underpass paint for general iron structures
restrictions on the use of the product	Prohibition of use outside of purpose, prohibition of youth sales
C. Supplier information (In case of imported goods, domestic supplier information available for emergency contact)	
Corporate name	Geumgang Paint Industry Co., Ltd
Address	86-75 Chugok-gil, Gogyeong-myeon, Yeongcheon-si, Gyeongsangbuk-do
an emergency telephone number	054-338-7722

2. Hazardous/hazardous

A. Hazard classification and risk classification

Skin Corrosive/Skin irritability: Classification 2
Severe eye damage/eye irritation: Category 2
Carcinogenicity: Classification 1B
Reproductive cell mutagenicity: Classification 1B
Aspiration hazard: Classification 1
Hazardous Acute Aquatic Environment: Classification 1
Chronic aquatic environmental hazards: Classification 1

B. Warning signs including preventive measures

Picture text

a sign language	Dangers
Hazardous and dangerous phrases	H304 Swallowing into the airways can be fatal
	H315 Causes irritation to the skin
	H340 May cause genetic defects
	Can cause H350 cancer
Preventive measures statement	
Prevention	Obtain a manual for handling P201 before use.
	P202 Do not handle all safety precautions until you have read and understood them.
	Wash the handling area thoroughly after handling P264.
	Wear P280 (protective gloves, protective clothing, safety glasses, face protection equipment).
Response	If you have swallowed P301+P310, seek medical attention immediately.
	P302+P352 Wash with plenty of water if it gets on your skin.
	P308+P313 seek medical measures and advice if exposed or concerned about exposure.
	P321 first aid.
	P331 Don't make me vomit.
	P332+P313 Seek medical measures and advice if skin irritation occurs.
	P362+P364 Take off contaminated clothing and wash it before use again.
Storage	P405 Store in a storage area with lock.
Disposal	Dispose of P501 contents containers (in accordance with relevant laws and regulations).

3. Name and content of components

Material name	METHYL ETHYL KETOXIME	CAS Number	Content (%)
2-butanone oxime		96-29-7	0.01-0.1

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Phthalic anhydride	64742-82-1	22-30
Phthalic acid anhydride	Phthalic anhydride	85-44-9	3-10
pentaerythritol	BURNT SIEN나(BURNT SIENNA);	115-77-5	2-6
IRON OXIDE	calcite (CA(CO3)(CA(CO3))(CALCITE(CA(	1332-37-2	4-10
CALCITE	talc,	13397-26-7	37-46
talc (without asbestos)	Talc	14807-96-6	2-7
glycerol	MIXED VEGETABLE OIL ACIDS;	56-81-5	1-7
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	ETHENE, HOMOPOLYMER, OXIDIZED;	61788-66-7	5-12
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	ORGANOPHILIC CLAY;	68441-17-8	0.1-2
(hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	친유기성 점토(ORGANOPHILIC CLAY);	68953-58-2	0.1-2
2-ethylhexane, rare earth salts		61788-37-2	0.01-0.2

4. emergency measures

A. When it gets into your eyes	Wash your eyes immediately under running water for at least 20 minutes upon contact with any material
	Take medical action immediately
	Get urgent medical attention
	Wash skin and eyes immediately with running water for at least 20 minutes upon contact with substances
	Wash carefully with water for a few minutes when it gets on your eyes. Remove them if possible. Keep washing.
	If eye irritation persists, seek medical action and advice.
B. When you come into contact with your skin	Wash your skin immediately under running water for at least 20 minutes upon contact with any substance
	Remove contaminated clothes and shoes and isolate them
	Wash clothes and shoes thoroughly before reuse
	Take medical action immediately
	If it is a hot material, soak or wash the affected area in a large amount of cold water to remove heat
	Get urgent medical attention
	Remove contaminated clothes and shoes and isolate contaminated areas
	Wash skin and eyes immediately with running water for at least 20 minutes upon contact with substances
	Prevent the spread of contaminated areas during minor skin contact
	In case of burns, cool the area immediately with cold water as long as possible, and do not remove any clothing attached to the skin
	Wash your skin with soap and water
	Remove all contaminated clothing if it gets on your skin (or hair). Wash/shower your skin with water.
	If you feel exposed or uncomfortable, see a medical institution (doctor).
	If you feel uncomfortable, see a medical doctor.
	Seek medical measures and advice if skin irritation occurs.
	Take off your contaminated clothing.
	Wash contaminated clothing before use again.
C. When you inhale it	Get urgent medical attention
	Move to a place with fresh air
	If you are not breathing, perform ventilation
	If you have difficulty breathing, supply oxygen
	Remove with clean air if exposed to excess dust or fumes and take medical action if you have cough or other symptoms.
	Move to a place with fresh air
	Get urgent medical attention
	If you are not breathing, perform ventilation

	If you eat or inhale substances, do not ventilate using mouth-to-mouth mouth exercise and use appropriate respiratory equipment
	If you have difficulty breathing, supply oxygen
	Please keep it warm and stable
	Seek medical measures and advice if exposed or concerned about exposure.
	If you feel exposed or uncomfortable, see a medical institution (doctor).
	See a medical institution immediately.
	See a medical institution.
	Don't make me vomit.
D. When I ate it	Don't feed an unconscious person anything with your mouth
	Take medical action immediately
	Get urgent medical attention
	If you eat or inhale substances, do not ventilate using mouth-to-mouth mouth exercise and use appropriate respiratory equipment
	If you have swallowed, see a medical doctor immediately.
	If you have swallowed, wash your mouth. Don't try to vomit.
	Seek medical measures and advice if exposed or concerned about exposure.
	If you feel exposed or uncomfortable, see a medical institution (doctor).
	Wash your mouth.
	Don't make me vomit.
E. Other precautions of doctors	Ensure that medical personnel are aware of the substance and take protective measures
	Do not administer adrenaline.
	Contact the medical staff in case of exposure and take special emergency measures such as follow-up.
	Symptoms caused by contact and inhalation may be delayed
	Ensure that medical personnel are aware of the substance and take protective measures

5. How to deal with explosion and fire

a. Proper (inappropriate) digestive medicine	
an appropriate (inappropriate) digestive medicine	Small fire: dry sand, dry chemical, alcohol-resistant foam, water spray, general foam, CO2 (appropriate fire extinguishing agent)
	Large fire: water spray/fog, regular foam (appropriate fire extinguishing agent)
	High Pressure Water (Inadequate Digestive)
	Use alcohol foam, carbon dioxide or water spray for digestion related to this substance
	Use dry sand or soil for asphyxiation
b. Certain hazards arising from chemicals	
a specific hazard arising from a chemical substance	Can be ignited by heat, spark and flame
	Containers may explode when heated
	Some may burn but do not ignite easily
	In case of fire, irritable and toxic gases can be generated
	Inhalation of substances can be harmful
	Some liquids may cause dizziness and vapor that causes suffocation
	Can decompose at high temperatures to produce toxic gases
	Intense polymerization can cause fire and explosion
	Steam can be transferred to ignition source and ignited
	During burning, irritating and very toxic gases can be generated by pyrolysis or combustion
	Can form explosive mixtures at or above flashpoints
	Containers may explode when heated
	When heated, steam can be mixed with air to form an explosive mixture: indoor, outdoor, sewers at risk of explosion
	High Mars: easily ignited by heat, spark, and flame
	Leaks are at risk of fire/explosion

Risk of steam explosion indoors, outdoors, and sewers

Some may burn but do not ignite easily

Steam can form an explosive mixture with air

Steam can travel to ignition source and flash back

Some may produce combustible hydrogen gas when in contact with metal

Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes

Toxic: Inhalation, ingestion, and skin contact can result in serious injury and death

Contact with molten materials can cause serious burns to the skin and eyes

Steam can cause dizziness or suffocation without awareness

Inhalation and contact irritates or burns skin and eyes

Inhalation and skin absorption may be toxic

Highly flammable liquids and vapors

Flammable liquids and vapors

C. Protective equipment and preventive measures to be worn in case of fire extinguishing

2-butanone oxime

Rescuers should wear appropriate protective gear.

Digest away from the area and keep a safe distance

Please be careful as it may melt and be transported

Some may be transported at high temperatures, so be careful

Dig a ditch for the disposal of the digester so that the material does not scatter

If it's not dangerous, move the container out of the fire area

In case of tank fire, extinguish fire at maximum distance or use unmanned fire extinguishing equipment

In case of tank fire, cool the container with plenty of water even after extinguishing

In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration

In the event of a tank fire, step back from the tank engulfed in flames

In case of tank fire, use unmanned fire extinguishing equipment and, if impossible, leave to burn

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy

Rescuers should wear appropriate protective gear.

Digest away from the area and keep a safe distance

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In the event of a tank fire, step back from the tank engulfed in flames

In case of tank fire, use unmanned fire extinguishing equipment and, if impossible, leave to burn

Phthalic acid anhydride

Rescuers should wear appropriate protective gear.

Digest away from the area and keep a safe distance

Because most vapors are heavier than air, they can diffuse along the ground and accumulate in low-lying or confined spaces

Be careful as it reacts (intensely) with water to release combustible, corrosive/toxic gases, etc

If it's not dangerous, move the container out of the fire area

In case of tank fire, extinguish fire at maximum distance or use unmanned fire extinguishing equipment

Do not allow water to enter the container

In case of tank fire, cool the container with plenty of water even after extinguishing

pentaerythritol	In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area
IRON OXIDE	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area
CALCITE	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area
talc	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames Rescuers should wear appropriate protective gear. Digest away from the area and keep a safe distance Please be careful as it may melt and be transported Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area In case of tank fire, extinguish fire at maximum distance or use unmanned fire extinguishing equipment
glycerol	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames In case of tank fire, use unmanned fire extinguishing equipment and, if impossible, leave to burn Digest away from the area and keep a safe distance Please be careful as it may melt and be transported Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area

Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	In case of tank fire, extinguish fire at maximum distance or use unmanned fire extinguishing equipment In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames In case of tank fire, use unmanned fire extinguishing equipment and, if impossible, leave to burn If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames Rescuers should wear appropriate protective gear. Digest away from the area and keep a safe distance Please be careful as it may melt and be transported Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area In case of tank fire, extinguish fire at maximum distance or use unmanned fire extinguishing equipment
2-ethylhexane, rare earth salts	In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames In case of tank fire, use unmanned fire extinguishing equipment and, if impossible, leave to burn If it's not dangerous, move the container out of the fire area Some may be transported to high temperatures Leaks may cause contamination Contact can cause burns to the skin and eyes Dig a ditch for the disposal of the digester so that the material does not scatter If it's not dangerous, move the container out of the fire area In case of tank fire, cool the container with plenty of water even after extinguishing In case of a tank fire, immediately withdraw from the pressure release unit if there is a high pitch or the tank discoloration In the event of a tank fire, step back from the tank engulfed in flames

6. How to deal with leakage accidents

A. Measures and protective equipment necessary to protect the human body	Remove all ignition sources
	If it is not dangerous, stop the leak
	Pay attention to substances and conditions that should be avoided
	Ventilate contaminated areas
	Do not touch or walk around exposed objects
	Avoid dust formation respirator or a vent mask, until adequate air (oxygen concentration 18–23.5%) is secured.
	Remove all ignition sources as very fine particles can cause fire or explosion.
	Wipe off any spills immediately, and follow the precautions of the protective equipment.
	Do not touch or walk around exposed objects
	Remove all ignition sources
	Be sure to ground all equipment when handling substances
	If it is not dangerous, stop the leak
	Do not touch damaged containers or leaks without wearing proper protective clothing
	Steam suppression foam can be used to reduce steam generation
	Do not allow water to enter the container
	Cover with plastic sheet to stop diffusion
	Pay attention to substances and conditions that should be avoided
	Do not inhale (dust, fume, gas, mist, steam, and spray).
	Avoid inhaling (dust, fume, gas, mist, steam, and spray).
B. Measures necessary to protect the environment	Do not discharge into the environment.
	Prevent inflows into waterways, sewers, cellars, and enclosed spaces
	Leaks may cause contamination
	Leaks are corrosive/toxic and may cause contamination
C. Methods of purification or removal	In case of a small leak, wash off the contaminated area with a large amount of water
	In case of small leaks, absorb with sand, non-combustible material and place in container
	In case of large leaks, make a ditch away from liquid leaks Place the leak in a clean, dry container with a clean shovel, close loosely, and transfer the container from the leak area
	In case of powder leakage, cover with plastic sheet to prevent diffusion and keep dry
	Build a levee for digestion and collect water.
	Absorb spills with inert substances (e.g., dry sand or soil) and place them in a chemical waste container.
	Remove airy dust and wet with water to prevent it from dispersing.
	Absorb liquid and wash off contaminated areas with detergent and water.
	In case of large leaks, make a ditch away from liquid leaks
	Use a clean explosive device to collect absorbed material

7. HANDLING AND STORING METHOD

A. Safety instructions	Pay attention to substances and conditions that should be avoided
	Wash thoroughly after handling
	Work with reference to engineering care and personal protective equipment
	Watch out for high temperatures
	Be careful not to leak out as it can cause suffocation in an enclosed place by lowering the oxygen concentration in the air. Check the oxygen concentration before entering the place as there is a risk of oxygen deficiency or death due to oxygen deficiency in high concentration in the air.

Be careful not to leak out, as the liquid rapidly evaporates and replaces air, causing serious suffocation when in a closed area.
Be careful not to leak out as it reaches the harmful concentration of this gas in the air very quickly.

If sprayed, it can reach harmful concentrations of air particles very quickly, so do not spray it.

At 20℃, this material evaporates somewhat slowly, reaching hazardous concentrations, so keep it below 20℃.

Evaporation rarely occurs at 20℃, but spraying can reach harmful concentrations of air particles very quickly, so do not spray.

Evaporation rarely occurs at 20℃, but do not spray or spray as spraying can reach harmful concentrations of air particles very quickly. (Especially for powder)

Evaporation rarely occurs at 20℃, but do not spray as spraying can reach harmful concentrations of air particles very quickly (especially for powder)

Check the oxygen level before entering the area.

Spray or spray will evaporate faster, so do not spray or spray.

Do not apply pressure, cut, weld, solder, bond, pierce, grind, or expose to heat, flame, flame, static electricity, or any other ignition source.

Follow all MSDS/label precautions as product debris may remain after the container has been emptied.

Use carefully when handling/storing.

Open the cap carefully before opening.

Avoid long-term or continuous skin contact.

Do not breathe steam from heated materials.

Do not enter the storage area without proper ventilation.

Be sure to ground all equipment when handling substances

Pay attention to substances and conditions that should be avoided

Work with reference to engineering care and personal protective equipment
Measure and ventilate the oxygen concentration in the air during work as there is a risk of oxygen deficiency when working in a confined space in low-lying areas

Do not handle all safety precautions until you have read and understood them.

Connect or ground containers and containers.

Use explosion-proof electricity, ventilation, lighting, and equipment.

Use only non-sparking tools.

Take antistatic measures.

Avoid inhaling (dust, fume, gas, mist, steam, and spray).

Wash the handling area thoroughly after handling.

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

Only handle outdoors or in well ventilated areas.
Follow all MSDS/label precautions as product debris may remain after the container has been emptied.

Use explosion-proof electricity, ventilation, lighting, and equipment.

B. A safe way to store

Keep it airtight

Store in a cool, dry place

Pay attention to substances and conditions that should be avoided
Drain the empty drum completely and block it properly, immediately return it to the drum controller or arrange it properly.

Stay away from food and beverages.

Pay attention to substances and conditions that should be avoided

Stay away from heat, sparks, flames, and high fever - don't smoke

Store the container tightly sealed in a well-ventilated place.

Store in a well-ventilated place and keep at low temperatures.

Store in a locked storage area.

8. Anti-exposure and personal protective equipment

A. Chemical exposure standards, biological exposure standards, etc

domestic regulations

2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	TWA - 1ppm
pentaerythritol	TWA - 10 mg/m3 pentaerythritol
IRON OXIDE	TWA - 5mg/m3 흄
IRON OXIDE	TWA - 5mg/m3
CALCITE	No data
talc	TWA - 6 mg/m3 Cowpstone
talc	TWA - 3 mg/m3 Cowpstone (respiratory)
talc	TWA - 2 mg/m3 talc [without asbestos, less than 1% silicon oxide crystals (respiratory)] However, for asbestos-containing talc, refer to asbestos (0.1 ea/cm3)
glycerol	TWA - 10 mg/m3 glycerin mist
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data

ACGIH regulations

2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	TWA 1 ppm
pentaerythritol	TWA 10 ㎎/㎥
IRON OXIDE	No data
CALCITE	No data
talc	STEL
talc	TWA 2 ㎎/㎥
talc	ETC
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data

biological exposure standards

2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
Other exposure criteria	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	TWA : 6mg/m3 - NIOSH
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
B. Proper engineering management	Use process isolation, local exhaust, or other engineering management to adjust the air level below the exposure limit.
	Install face wash facilities and safety showers for facilities that store or use this substance.
	Use process isolation, local exhaust, or other engineering management to adjust the air level below the exposure limit.
	If dust, fumes, or mist is generated during operation, ventilate to ensure air pollution remains below the exposure limit
	Use process isolation, local exhaust, or keep the air level below the exposure limit
C. Personal protective equipment	
Respiratory protection	
2-butanone oxime	Wear a respirator certified by the Occupational Safety and Health Agency to match the physicochemical properties of the exposed material
2-butanone oxime	-A face filter type dust mask or an air filter type dust mask (high-efficiency fine particle filter) or a dust mask with an electric fan (dust, mist, fume filter)
2-butanone oxime	"For gas/liquid substances, the following respiratory protection is recommended
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	-Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or direct front gas mask (for organic compounds (for acid gases in case of acid gases) or on the other hand gas mask (for organic compounds (for acid gases in case of acid gases) or electric gas mask"
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed gases/liquid
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	"For gas/liquid substances, the following respirator is recommended
Phthalic acid anhydride	-Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or direct front gas mask (for organic compounds (for acid gases in case of acid gases) or on the other hand gas mask (for organic compounds (for acid gases in case of acid gases) or electric gas mask"
Phthalic acid anhydride	If oxygen is low (<19.5%), wear a vent mask or self-contained air respirator
Phthalic acid anhydride	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
Phthalic acid anhydride	If the exposure concentration is lower than 10 ppm, wear the appropriate type of filter while wearing a type of respirator

Phthalic acid anhydride	If the exposure concentration is lower than 25 ppm, wear a loose-fitting hood/helmet electric respirator or continuous flow dust mask with the appropriate type of filter
Phthalic acid anhydride	If the exposure concentration is lower than 50 ppm, wear a front or electric type or air-supplied continuous flow type/pressure requirement type respirator with appropriate filter
pentaerythritol	If the exposure concentration is lower than 1000 ppm, wear a front or helmet/hood type with appropriate filter, pressure-required air mask
pentaerythritol	If the exposure concentration is lower than 10000 ppm, wear a self-airing (SCBA) or pressure-required self-airing (SCBA) respirator with appropriate filters
pentaerythritol	pentaerythritol
pentaerythritol	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
pentaerythritol	If the exposure concentration is less than 100mg/m3, wear the appropriate type of filter while wearing the type of respirator
pentaerythritol	If the exposure concentration is less than 250 mg/m3, wear a loose-fitting hood/helmet type electric respirator or continuous flow dust mask with the appropriate type of filter
pentaerythritol	If the exposure concentration is lower than 500mg/m3, wear a front or electric or air-supplied continuous flow/pressure requirement type respirator with appropriate filter
IRON OXIDE	If the exposure concentration is lower than 10000mg/m3, wear a front or helmet/hood type with appropriate filter, pressure-required air mask
IRON OXIDE	If the exposure concentration is lower than 100000 mg/m3, wear a self-airing (SCBA) or pressure-required self-airing (SCBA) respirator with appropriate filters
IRON OXIDE	Hume
IRON OXIDE	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
IRON OXIDE	If the exposure concentration is lower than 50mg/m3, wear the appropriate type of filter while wearing a type of respirator
IRON OXIDE	If the exposure concentration is lower than 125mg/m3, wear a loose-fitting hood/helmet type electric respirator or continuous flow dust mask with the appropriate type of filter
IRON OXIDE	If the exposure concentration is lower than 250 mg/m3, wear a front or electric or air-supplied continuous flow/pressure requirement type respirator with appropriate filter
IRON OXIDE	If the exposure concentration is lower than 5000 mg/m3, wear a front or helmet/hood type with appropriate filter, pressure-required air mask
IRON OXIDE	If the exposure concentration is lower than 50000 mg/m3, wear a self-airing (SCBA) or pressure-required self-airing (SCBA) respirator with appropriate filters
	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
	If the exposure concentration is lower than 50mg/m3, wear the appropriate type of filter while wearing a type of respirator
IRON OXIDE	If the exposure concentration is lower than 125mg/m3, wear a loose-fitting hood/helmet type electric respirator or continuous flow dust mask with the appropriate type of filter
IRON OXIDE	If the exposure concentration is lower than 250 mg/m3, wear a front or electric or air-supplied continuous flow/pressure requirement type respirator with appropriate filter
IRON OXIDE	If the exposure concentration is lower than 5000 mg/m3, wear a front or helmet/hood type with appropriate filter, pressure-required air mask
IRON OXIDE	If the exposure concentration is lower than 50000 mg/m3, wear a self-airing (SCBA) or pressure-required self-airing (SCBA) respirator with appropriate filters
CALCITE	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
CALCITE	"For particulate matter, the following respiratory protection is recommended

CALCITE	
talc	If oxygen is low (<19.6%), wear a ventilation mask or self-contained respirator
talc	Sowpstone
talc	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of the exposed material
talc	Sowpstone (breathing)
talc	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of the exposed material
talc	talc [no asbestos, less than 1% silicon oxide crystals (respiratory)] However, for talc containing asbestos, see asbestos (0.1 ea/cm3)
glycerol	Wear respirators certified by the Korea Occupational Safety and Health Agency that conform to the physicochemical properties of the exposed material
glycerol	glycerin mist
glycerol	Wear respirators certified by the Korea Occupational Safety and Health Agency to suit the exposed gas/liquid physicochemical characteristics
glycerol	If the exposure concentration is less than 100mg/m3, wear a suitable filter or a septic while wearing a type of respirator
glycerol	If the exposure concentration is less than 250 mg/m3, wear a loose-fitting hood/helmet type electric respirator or continuous flow dust mask (the dust mask is only for liquid aerosols)
glycerol	If the exposure concentration is lower than 500mg/m3, wear a front or electric type or air-supplied continuous flow type/pressure requirement type respirator with appropriate filter or septic tank
glycerol	If the exposure concentration is lower than 10000mg/m3, wear a front or helmet/hood type with appropriate filter or purification tank, pressure-required air mask
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	If the exposure concentration is lower than 100000 mg/m3, wear a self-air supply (SCBA) or pressure-required self-air supply (SCBA) respirator with appropriate filters or septic tanks
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed gases/liquid
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	"For gas/liquid substances, the following respirator is recommended
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	-Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or direct front gas mask (for organic compounds (for acid gases in case of acid gases) or on the other hand gas mask (for organic compounds (for acid gases in case of acid gases) or electric gas mask"
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	If oxygen is low (<19.5%), wear a vent mask or self-contained air respirator
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	"For particulate matter, the following respiratory protection is recommended
	If oxygen is low (<19.6%), wear a ventilation mask or self-contained respirator
	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed particulate matter
	"For particulate matter, the following respiratory protection is recommended
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	If oxygen is low (<19.6%), wear a ventilation mask or self-contained respirator
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Wear respirators certified by the Occupational Safety and Health Agency that conform to the physicochemical properties of exposed gases/liquid
2-ethylhexane, rare earth salts	"For gas/liquid substances, the following respirator is recommended

2-ethylhexane, rare earth salts	-Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or Isolated front gas mask (for organic compounds (for acid gases in case of acid gases) or direct front gas mask (for organic compounds (for acid gases in case of acid gases) or on the other hand gas mask (for organic compounds (for acid gases in case of acid gases) or electric gas mask"
2-ethylhexane, rare earth salts	If oxygen is low (<19.5%), wear a vent mask or self-contained air respirator
eye protection	Wear the following safety glasses that may cause eye irritation or other health problems. - Closed-type safety glasses for gaseous organic matter - Air-permeable safety glasses for vapor organic matter - Air-permeable safety glasses for particulate matter
	Install emergency cleaning facilities (shower type) and face wash facilities in locations where workers can access them
	To protect your eyes from vaporized organic substances that cause eye irritation or other health problems, wear safety or breathable safety glasses
	Install emergency cleaning facilities (shower type) and face wash facilities in locations where workers can access them
Hand protection	Wear protective gloves of appropriate material considering the physical and chemical properties of chemicals
physical protection	Wear protective clothing of appropriate material considering the physical and chemical properties of the chemical

9. physicochemical properties

A. Appearance	
character	Liquid
Color	Colored
I. The smell	a distinctive smell
C. Smell threshold	No data
D. pH	No data
E. Melting/freezing point	-70 ℃
F. Initial boiling point and boiling point range	130 ~ 230℃
G. A flashpoint	27℃ or higher
H. Evaporation rate	No data
I. Flammable (solid, gas)	Flammable
J. Upper/lower limits on the range of flammables or e›	No data
J. Steam pressure	No data
T. Solubility	(Insoluble)
F. Steam density	No data
Ha. Specific gravity	1.2~ 1.5
G. N-octanol/water distribution coefficient (Kow)	No data
You. Natural firing temperature	232 ℃
More. Decomposition temperature	No data
R. Viscosity	80~ 120KU
M. molecular weight	No data

10. Stability and responsiveness

a. Chemical stability and possibility of adverse reactions	
2-butanone oxime	Can decompose at high temperatures to produce toxic gases
2-butanone oxime	Containers may explode when heated
2-butanone oxime	Some may burn but do not ignite easily
2-butanone oxime	Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Can decompose at high temperatures to produce toxic gases
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Containers may explode when heated
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Some may burn but do not ignite easily

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes
Phthalic acid anhydride	If heated or contaminated with water, containers can explode
Phthalic acid anhydride	When heated, steam can be mixed with air to form an explosive mixture: indoor, outdoor, sewers at risk of explosion
Phthalic acid anhydride	Some may burn but do not ignite easily
Phthalic acid anhydride	Steam can travel to ignition source and flash back
Phthalic acid anhydride	Some may produce combustible hydrogen gas when in contact with metal
Phthalic acid anhydride	Corrosive/toxic: Inhalation, ingestion, and contact of vapor, dust, and substances can result in serious injury, burns and death
Phthalic acid anhydride	Contact with molten materials can cause serious burns to the skin and eyes
Phthalic acid anhydride	Fire can cause irritable, corrosive, and toxic gases
pentaerythritol	Stable at room temperature and pressure
pentaerythritol	Containers may explode when heated
pentaerythritol	Some may burn but do not ignite easily
pentaerythritol	In case of fire, irritable and toxic gases can be generated
pentaerythritol	Inhalation of substances can be harmful
pentaerythritol	Some liquids may cause dizziness and vapor that causes suffocation
IRON OXIDE	Stable at room temperature and pressure
IRON OXIDE	Containers may explode when heated
IRON OXIDE	Some may burn but do not ignite easily
IRON OXIDE	In case of fire, irritable and toxic gases can be generated
IRON OXIDE	Inhalation of substances can be harmful
IRON OXIDE	Some liquids may cause dizziness and vapor that causes suffocation
CALCITE	Stable at room temperature and pressure
CALCITE	Containers may explode when heated
CALCITE	Some may burn but do not ignite easily
CALCITE	In case of fire, irritable and toxic gases can be generated
CALCITE	Inhalation of substances can be harmful
CALCITE	Some liquids may cause dizziness and vapor that causes suffocation
talc	Containers may explode when heated
talc	Some may burn but do not ignite easily
talc	Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes
talc	Fire can cause irritable, corrosive, and toxic gases
glycerol	Can decompose at high temperatures to produce toxic gases
glycerol	Containers may explode when heated
glycerol	Some may burn but do not ignite easily
glycerol	Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Stable at room temperature and pressure
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Containers may explode when heated
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Some may burn but do not ignite easily
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	In case of fire, irritable and toxic gases can be generated
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Inhalation of substances can be harmful
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Some liquids may cause dizziness and vapor that causes suffocation
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Stable at room temperature and pressure
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Containers may explode when heated
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Some may burn but do not ignite easily

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	In case of fire, irritable and toxic gases can be generated
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Inhalation of substances can be harmful
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Some liquids may cause dizziness and vapor that causes suffocation
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Containers may explode when heated
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Some may burn but do not ignite easily
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Non-inflammable or material itself does not burn, but decomposes when heated to cause corrosive/toxic fumes
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Fire can cause irritable, corrosive, and toxic gases
2-ethylhexane, rare earth salts	Stable at room temperature and pressure
2-ethylhexane, rare earth salts	Containers may explode when heated
2-ethylhexane, rare earth salts	Some may burn but do not ignite easily
2-ethylhexane, rare earth salts	In case of fire, irritable and toxic gases can be generated
2-ethylhexane, rare earth salts	Inhalation of substances can be harmful
2-ethylhexane, rare earth salts	Some liquids may cause dizziness and vapor that causes suffocation
B. Conditions to avoid	
2-butanone oxime	Ignition sources such as heat, spark, flame, etc
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Ignition sources such as heat, spark, flame, etc
Phthalic acid anhydride	Ignition sources such as heat, spark, flame, etc
pentaerythritol	Ignition sources such as heat, spark, flame, etc
IRON OXIDE	Ignition sources such as heat, spark, flame, etc
CALCITE	Ignition sources such as heat, spark, flame, etc
talc	Ignition sources such as heat, spark, flame, etc
glycerol	Ignition sources such as heat, spark, flame, etc
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Ignition sources such as heat, spark, flame, etc
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Ignition sources such as heat, spark, flame, etc
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Ignition sources such as heat, spark, flame, etc
2-ethylhexane, rare earth salts	Ignition sources such as heat, spark, flame, etc
C. Substances that should be avoided	
2-butanone oxime	combustible substances
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	combustible substances
Phthalic acid anhydride	Metal
Phthalic acid anhydride	Water
pentaerythritol	combustible material
pentaerythritol	irritable, toxic gases
IRON OXIDE	combustible material
IRON OXIDE	irritable, toxic gases
CALCITE	combustible material
CALCITE	irritable, toxic gases
talc	combustible substances
talc	Separation group:
glycerol	combustible substances
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	combustible material

Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	irritable, toxic gases
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	combustible material
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	irritable, toxic gases
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	combustible substances
2-ethylhexane, rare earth salts	combustible material
2-ethylhexane, rare earth salts	irritable, toxic gases

D. Hazardous substances produced during decomposition

2-butanone oxime	During burning, irritating and very toxic gases can be generated by pyrolysis or combustion
2-butanone oxime	Corrosive/toxic fumes
2-butanone oxime	irritable, toxic gases
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	During burning, irritating and very toxic gases can be generated by pyrolysis or combustion
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Corrosive/toxic fumes
Phthalic acid anhydride	During burning, irritating and very toxic gases can be generated by pyrolysis or combustion
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	Corrosive/toxic fumes
talc	irritable, corrosive, toxic gases
glycerol	Corrosive/toxic fumes
glycerol	irritable, corrosive, toxic gases
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	During burning, irritating and very toxic gases can be generated by pyrolysis or combustion
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Corrosive/toxic fumes
2-ethylhexane, rare earth salts	No data

11. information about toxicity

A. Information on most likely exposure routes

2-butanone oxime	"Could cause irritation, drowsiness and blood disorders.
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	It can cause irritation, nausea, vomiting, drowsiness, and blood disorders.
Phthalic acid anhydride	Possibly fatal during skin contact, irritation, and allergic reactions.
pentaerythritol	It can cause irritation (sometimes severe)."
pentaerythritol	No data
pentaerythritol	Substances that can be absorbed into mucous membranes, eyes, and skin and cause systemic effects (ACGIH, Ministry of Employment No. 2018-24; skin)
pentaerythritol	Can be absorbed by the body by inhalation
pentaerythritol	Inhalation and absorption by fire extinguishers
IRON OXIDE	Can be absorbed by the body by inhalation of aerosols through the skin, digestive system
IRON OXIDE	Can be absorbed by the body by the inhalation of steam
IRON OXIDE	Inhalation, skin, and body absorption by digestive organs
IRON OXIDE	Can be absorbed by the body by inhalation
IRON OXIDE	Inhalation and absorption by fire extinguishers

CALCITE	Can be absorbed by the body by inhalation of aerosols through the skin, digestive system
talc	Can be absorbed by the body by the inhalation of steam
glycerol	Inhalation, skin, and body absorption by digestive organs
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	"Short-term exposure is a stimulus."
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Short-term exposure is a minor irritation"
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Can be absorbed by the body by inhalation
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Inhalation and absorption by fire extinguishers
2-ethylhexane, rare earth salts	Can be absorbed by the body by inhalation of aerosols through the skin, digestive system
2-ethylhexane, rare earth salts	Can be absorbed by the body by the inhalation of steam
2-ethylhexane, rare earth salts	Inhalation, skin, and body absorption by digestive organs
2-ethylhexane, rare earth salts	"Could cause irritation to the respiratory tract "Could cause irritation by contacting the eyes" Can be absorbed by the body by inhalation Inhalation and absorption by fire extinguishers Can be absorbed by the body by inhalation of aerosols through the skin, digestive system Can be absorbed by the body by the inhalation of steam

2-ethylhexane, rare earth salts

B. Health hazard information

acute toxicity

an oral form

2-butanone oxime	Inhalation, skin, and body absorption by digestive organs

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy

Phthalic acid anhydride

pentaerythritol

pentaerythritol

IRON OXIDE	LD50 930 mg/kg Rat
CALCITE	LD50 > 5000 mg/kg Rat
talc	LD50 1530 mg/kg Rat
talc	LD50 > 5110 mg/kg Rat
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	LD50 > 5000 mg/kg Rat
2-ethylhexane, rare earth salts	No data
transdermal skin	LD50 27000 mg/kg Rat
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	LD50 > 5000 mg/kg Rat
pentaerythritol	No data

pentaerythritol	
IRON OXIDE	LD50 185 ㎎/㎏ Rabbit
CALCITE	LD50 > 3160 ㎎/㎏ Rabbit
talc	LD50 > 3160 ㎎/㎏ Rabbit
talc	LD50 > 10000 ㎎/㎏ Rabbit
glycerol	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	LD50 > 2000 ㎎/㎏ Rat
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	LD50 45 ㎖/㎏ Guinea pig
Inhale	No data
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
pentaerythritol	LC50 20 ㎎/ℓ 4 hr Rat No data 분진 LC50> 2.14 ㎎/ℓ 4 hr Rat (OECD TG 403, GLP) Dust LC50> 5.15mg/l 4hr Rat No data
IRON OXIDE	No data
CALCITE	No data
talc	Mist LC50> 2.1 mg/L 4 hr Rat ((similar material test data)
glycerol	Steam LC50> 2.75 mg/L 4 hr Rat
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	분진 LC50> 12.6 ㎎/ℓ 4 hr Rat (GLP data)
2-ethylhexane, rare earth salts	No data
Corrosive or irritable skin	
2-butanone oxime	Non-polar (rabbit)
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Normal stimulation (rabbit)
Phthalic acid anhydride	"Skin Corrosion/Stimulus Test Results in Rabbits, No Stimulus Index: 0
pentaerythritol	Skin Corrosion/Stimulating Test Results in Rabbits: Mild Stimulating PDII: 1.5"
IRON OXIDE	Edema score: 0/0, not in GHS classification criteria, Rabbit, OECO Guideline for Testing of Chemicals. OECO, ISBN-92-64-12221-4 (1981)
CALCITE	No data
talc	No data
glycerol	Relative tissue survival (%): 112.9, non-irritating, human, EU Method B.46
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No irritation as a result of skin corrosiveness/stimulation experiments using rabbits
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data

2-ethylhexane, rare earth salts	No irritation to the skin
Severe eye damage or irritation	No data
2-butanone oxime	
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Severe stimulation (100ul, rabbit)
Phthalic acid anhydride	Non-polar (rabbit)
pentaerythritol	Eye damage/stimulation test results in rabbits, irritable stimulation index: 0.5-4 occurs, but recovers within 7 days
IRON OXIDE	Not applicable to GHS classification criteria, Rabbit, Corneal Confusion (0), iris (0), conjunctival congestion (0), conjunctival edema (0), OECD TG 405
CALCITE	No data
talc	No data
talc	No hypersensitivity, Rat, in vivo, male
glycerol	No irritation, Rabbit, Corneal Confusion (0), iris (0), conjunctival congestion (1.2), conjunctival edema (0.7), OECD TG 405
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No irritation, Rabbit, totally reversible
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	Moderate eye irritation observed in animal experiments
respiratory sensitivity	No data
2-butanone oxime	
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	"Responding to the respiratory hypersensitivity test on guinea pigs, it is found to be a substance with hypersensitivity due to infection with the serum albumin PA-GPSA complex of guinea pigs."
IRON OXIDE	Respiratory hypersensitivity tests in guinea pigs have found serological analysis that causes respiratory allergies."
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
skin sensitivity	No data
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	"Dermatosensitivity Test Results in Mice, Hypersensitivity Index at 2.5-10% Concentrations: 26-20.9 OECD TG 429
CALCITE	Skin hypersensitivity test for guinea pigs for 12-14 days after 48 hours of exposure found hypersensitivity in 90% guinea pigs OECD TG 406"
talc	Not classified according to GHS criteria (no hypersensitivity), Mouse, Localized Lymph node trial (LLNA), GLP, female, OECD TG 429
glycerol	No data

Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No hypersensitivity, guinea pig, female, OECD TG 406
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
carcinogenicity	No data
Occupational Safety and Health Act	Does not cause skin sensitivity
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	
Phthalic acid anhydride	
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
Ministry of Employment and Labor Examination	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	1A (limited to talc containing asbestos)
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
IARC	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	3
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
OSHA	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
ACGIH	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	A4
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	A4
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
NTP	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
EU CLP	

2-butanone oxime	2
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	1B
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	** EU CLP: 1B
germ cell mutagenicity	"Return mutation test results with in vitro microorganisms, negative OECD TG 471
2-butanone oxime	Gene mutation test using mammalian culture cells in vitro shows negative OECD TG 476, GLP regardless of the presence or absence of metabolic activity system
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	DNA damage test through sister chromatin analysis of mammals in vitro negative with or without metabolism
Phthalic acid anhydride	Chromosomal aberration test using mammalian cells in vitro, negative with or without metabolic activity"
pentaerythritol	in vitro – reversible mutation test with bacteria: negative (S. typhimurium TA98, regardless of metabolism), OECD TG 471, GLP
IRON OXIDE	No data
CALCITE	No data
talc	"in vivo – genetic mutation test with mammalian germ cells: negative (rat, male), OECD TG 478
glycerol	in vitro – chromosomal aberration test with mammalian cells: negative (rat pleural mesomal cells (RPMC), no metabolic system), OECD TG 473, EU Method B.10"
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	in vitro – reversible mutation test with bacteria: negative (S. typhimurium TA1535, TA1537, TA98, TA100, regardless of metabolism)
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
reproductive toxicity	No data
2-butanone oxime	
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	"Oral reproductive toxicity test in rats shows no significant effect NOAEL = 1,000 mg/kg bw/day
IRON OXIDE	32 Week Oral Reproductive Toxicity Trial Results In Mice No Significant Effects observed NOAEL = 3,570 (male), 1,785 (female) mg/kg bw/day"
CALCITE	"No evidence of reproductive or developmental toxicity at marginal doses of 1000 mg/kg bw/d under the conditions of this study," OECD TG 422, GLP
talc	Under the conditions of this study, both maternal and fetal NOAELs are considered 1000 mg/kg/day, rat, OECD TG 414, GLP"
glycerol	No data
	No data

	"Daily administration of 900 mg of talc/kg body weight to pregnant rabbits on days 6 to 18 of pregnancy showed no effect on the fetus. No dose-related effects were seen in reproductive function. NOAEL is considered 900 mg/kg bw/day in reproductive toxicity studies. Guidelines: OECD TG 416, equivalent to or similar to GLP NOAEL (developmental toxicity) = 1600 mg/kg bw/day, administration of 1600 mg/kg bw talc in corn oil did not affect reproductive, developmental indicators, did not affect maternal, fetal survival, rat, GLP" "The exposure time of glycerin to male and female rats by oral gavage over two generations showed no effect on growth, reproduction, and reproductive function through the second generation. There was no effect on progeny developmental toxicity in female mice given glycerin, rat"
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
Specific target organ toxicity (one exposure)	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	"Acute inhaled long-term toxicity test in rats shows abnormal breathing, eye discharge, facial light, anal color change, weight loss, lung and liver discoloration, OECD TG 403, GLP
pentaerythritol	Inhaling in humans causes fever in the upper airways
IRON OXIDE	"Execution: The only signs of toxicity were diarrhea, and 7 hours after administration, in 3 rats (2 males and 1 female). All other rats were normal / No abnormalities in autopsy (Rats / Male / Female / OECD TG 401 / GLP) Inhalation: When removed from the chamber after a 4-hour inhalation study, signs of a bent posture and standing hairs are commonly seen during short periods in animals. Wet fur is usually recorded during exposure and during short periods after exposure. It is considered to be due to the inhibition procedure, and a reduced respiratory rate was observed in all animals upon removal from the chamber and at 1 h after removal. One day after exposure, all animals exhibited only increased respiratory rates. On day 2 postexposure, all animals recovered normally. / No macroscopic abnormalities were found among the animals at autopsy.
CALCITE	(Ratt/male/female/OECD TG 403/GLP) "
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	"Executive: No observed clinical signs / No specific pathological abnormalities found (Ratt / Male / OECD TG 423 / GLP) Percutaneous: Test items showed mild signs of skin irritation (weak scratch) after single-dose application to one female (n° 14) on days 3 and 4. The clinical signs observed were present only on the day of application, possibly due in part to stress induced by the application process. These signs are: Red nose discharge to one female (n° 15) at 2, 3, and 4 hours and to three males (n° 21, 23, 24) at 1, 2, 3, and 4 hours. One male (n° 21) immediately developed diarrhea after 30 minutes and 1 hour. At autopsy, female number 14 showed tissue changes in the fluid-filled large intestine. Since this finding was seen in only one animal and was not related to any specific clinical signs, it was unlikely to be related to the test items
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	(Ratt/male/female/OECD TG 402/GLP)
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Inhalation: No clinical signs were observed during exposure. After exposure, blephar hyperplasia and congenital manifestations were observed in two males and one female on day 1 alone. (Ratt / Male / Female / OECD TG 403 / GLP) "
	"Expercussion: pre-death muscle spasms and epileptic spasms, survivors normal within 2.5 hours of administration. / Hyperhematosis of the pylorus and small intestine; pulmonary congestion; pale zira; and hyperhematosis of meninges in 3 individuals.

	Percutaneous: After about 12 hours, the experimental animal (guinea pig) became accustomed to the limitation of bandages and performed feeding activities as usual. The experimental animal group to which a large amount of experimental substances was applied was dying of weakness due to a drop in body temperature. It does not seem to be affected by the amount of a small amount of experimental substances applied. In conclusion, skin irritation was not observed with the amount of experiment applied to this cotton pad.
	Inhalation: Acute toxicity (produced by passing air through a test substance heated to 200°C) was measured after a 1-hour or 2-hour exposure to saturated vapor of glycerin. Under the study conditions, acute inhalation exposure of rats for 2 hours to saturated vapor produced a 100% mortality, whereas no mortality was observed for a 1-hour exposure. The nominal concentration was 11.0 mg/L and this study was a condensing aerosol. Therefore, the 1-hour LC50 based on the nominal concentration was >11.0 mg/L. According to OECD GHS guidelines, it is possible to determine the 4-hour LC50 from the 1-hour LC50 divided by 4 hours. Therefore, the 4-hour LC50 calculated based on the nominal concentration was >2.75 mg/L. In addition, L(Ct) 50 was measured after exposure to 1100 mg/L. The L(Ct) 50 of glycerin was 4655 mg/L."
2-ethylhexane, rare earth salts	No data
Specific target organ toxicity (repeated exposure)	
2-butanone oxime	Repeated exposure test results affect hematopoietic system
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	"Repeated oral toxicity test in mice shows female mice lose weight, lung and kidney lymphocytes; chronic bile duct inflammation, male adrenal atrophy LOAEL = ca.1,717 female, ca.2,340 male mg/kg bw/day
pentaerythritol	The results of the 13-week repeated oral toxicity test in rats showed that males lost less than 10% of their weight at high concentrations and females were not affected at high-low concentrations. There was no statistically significant difference in mortality and severe chronic inflammatory degenerative or proliferative degeneration occurs. NOAEL = 500 mg/kg, some effects on weight loss, lungs and kidneys were observed, but the concentration in which the effects were observed was observed as an effect at high concentrations and was not classified."
IRON OXIDE	Oral (substituted): Once a day oral (gastrointestinal) administration of pentaerythritol is well tolerated in rats up to 1000 mg/kg bw/d dose; only saliva secretion is recorded; no target organ effects are observed at any dose level; considered NOAEL=1000 mg/kg-bw/day; Rat, OECD TG 408, GLP
CALCITE	No data
talc	No data
glycerol	"Prologic (chronic): oral exposure using talc as feed for 101 days in rats (cancer/male) showed NOAEL of 100 mg/kg/day. There were no adverse events at the typical toxic terminus, and one of the animals treated with talc showed gastric smooth muscle sarcoma. However, sarcoma not associated with talc treatment was found in the uterus of both animals. No chronic pathological effect associated with oral administration in rats, Rat, OECD TG 452
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Inhalation (chronic): Through rats, exposure for 7.5 hours a day and 5 days a week at a concentration of 10.8 mg talc/㎥ of dust breathable for 6 to 12 months showed that the two groups with treatment periods of 6 and 12 months showed high mortality. 50% of the animals died during treatment in both groups, and exposure to the test substance resulted in distinct fibrosis. Pulmonary adenoma detected in 1 of 24 animals exposed, Rat, OECD TG 452"
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	"Experience (chronic): NOAEL= 8000-10,000 mg/kg bw, Rat
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Percutaneous (substituted): Percutaneous exposure with rabbits at a dose level of 4.0 ml/kg for 8 hours/day, 5 days/week, 45 weeks, no significant effect, Rabbit
2-ethylhexane, rare earth salts	Inhalation (Achronic): NOAEL is 167mg/m3 based on the local stimulation effect in the upper airways, Rat"
Harmful to aspiration	No data
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Results of repeated exposure study NOAEL (12-week rate) = approx. 12,500-25,000 mg/kg-bw/day
Phthalic acid anhydride	No data

pentaerythritol	
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
Other Hazardous Effects	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data

12. environmental impact

a. Ecotoxicity

Fish

2-butanone oxime	LC50 843 ㎎/ℓ 96 hr
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	LC50 > 99 ㎎/ℓ 96 hr 기타 (Oryzias latipes, OECD Guideline 203, GLP)
pentaerythritol	LC50 > 100 ㎎/ℓ 96 hr Oryzias latipes
pentaerythritol	(water index, freshwater, GLP)
IRON OXIDE	No data
CALCITE	LC50 554000 ㎎/ℓ 96 hr
talc	LC50 89581.016 ㎎/ℓ 96 hr Fishes species
talc	(QSAR, Exponential)
glycerol	LC50 54000 ㎎/ℓ 96 hr Oncorhynchus mykiss
glycerol	(water index, freshwater, GLP)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
crustaceans	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	LC50 4.3 ㎎/ℓ 96 hr 기타 (Crangon crangon)

Phthalic acid anhydride	EC50 71 ㎎/ℓ Daphnia magna (OECD TG 202, GLP)
pentaerythritol	EC50 > 1000 ㎎/ℓ 24 hr Daphnia magna
pentaerythritol	(water index, freshwater, GLP)
IRON OXIDE	No data
CALCITE	LC50 446000 ㎎/ℓ 48 hr
talc	LC50 36812.359 ㎎/ℓ 48 hr Daphnid species
talc	(QSAR model, QSAR model, 담수)
glycerol	LC50 1955 ㎎/ℓ 48 hr Daphnia magna
glycerol	(water index, freshwater)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM…	No data
2-ethylhexane, rare earth salts	No data
bird	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	EC50 68 ㎎/ℓ 72 hr Selenastrum capricornutum (OECD TG 201, GLP)
pentaerythritol	EC50 > 1000 ㎎/ℓ 72 hr Pseudokirchneriella subcapitata
pentaerythritol	(OECD TG 201, Exponential, Freshwater, GLP)
IRON OXIDE	No data
CALCITE	EC50 220000 ㎎/ℓ 96 hr
talc	EC50 7202.7 ㎎/ℓ 96 hr Green algae
talc	(QSAR model, QSAR model, 담수)
glycerol	EC3 > 10000 ㎎/ℓ 8 day Scenedesmus quadricauda
glycerol	(water index, freshwater)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM…	No data
2-ethylhexane, rare earth salts	No data
B. Residual and degradable	
Residuality	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	log Kow 2.1 to 6 (estimated)
Phthalic acid anhydride	No data
pentaerythritol	01 -1.7 log Kow
pentaerythritol	(log Pow, 23℃)
IRON OXIDE	No data
CALCITE	log Kow -2.12
talc	01 -9.4 log Kow
talc	(log Pow, 25℃)
glycerol	01 -1.75 log Kow
glycerol	(log Pow, 25℃)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	log Kow 2.64
Degradable	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	Average BOD5/COD biodegradation is 100.9%
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	BOD5/COD COD, TOC for 0 hours 0%, 0%, 2 hours 14%, 18%, 4 hours 32%, 38%, 24 hours: 92%, 93%, respectively
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
C. Bio-enriched	
Concentration	
2-butanone oxime	BCF 0.55 ((25℃), Cyprinus carpio(Fish, fresh water), 2mg/l)
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	01 0.3 ~ 0.6 BCF
IRON OXIDE	No data
CALCITE	BCF 3.162
talc	01 3.162 BCF
talc	(ℓ/㎏)
glycerol	01 3 BCF
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
biodegradable	
2-butanone oxime	24.7 (%) 28 days ((aerobic, activated sludge))
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	83.7 01 28 day
pentaerythritol	(CO2 evolution)
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	60 01 2 hr
glycerol	(TOC removal)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
D. Soil mobility	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
E. Other harmful effects	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	"어류: NOECOncorhynchus mykiss = 10 mg/L, LOEC = 32 mg/L 60d
pentaerythritol	갑각류: NOECDaphnia magna = 16 mg/L 21d OECD TG 211, GLP
IRON OXIDE	조류: NOECSelenastrum capricornutum = 32 mg/L 72hr OECD TG 201, GLP"
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data

No data

13. Precautions for disposal

A. Method of disposal	
2-butanone oxime	Dispose of contents and containers as stipulated in the Waste Management Act.
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Dispose of contents and containers as stipulated in the Waste Management Act.
Phthalic acid anhydride	No data
pentaerythritol	Dispose of contents and containers as stipulated in the Waste Management Act.
IRON OXIDE	No data
CALCITE	(1) High-temperature melting or solidification of dust, debris, or anything that is crushed by the force of an adult's grasp. 2) What is solidified and does not need to be scattered should be wrapped in polyethylene or other similar-material bags and buried in designated waste landfill facilities."
talc	
glycerol	Dispose of contents and containers as stipulated in the Waste Management Act.
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Dispose of contents and containers as stipulated in the Waste Management Act.

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Dispose of contents and containers as stipulated in the Waste Management Act.
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Dispose of contents and containers as stipulated in the Waste Management Act.
2-ethylhexane, rare earth salts	Dispose of contents and containers as stipulated in the Waste Management Act.
B. Precautions for disposal	No data
2-butanone oxime	
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Dispose of the contents containers (in accordance with the relevant laws and regulations).
Phthalic acid anhydride	Dispose of the contents containers (in accordance with the relevant laws and regulations).
pentaerythritol	Dispose of the contents containers (in accordance with the relevant laws and regulations).
IRON OXIDE	Consider the precautions specified in the regulations if specified in the Waste Management Act.
CALCITE	Consider the precautions specified in the regulations if specified in the Waste Management Act.
talc	Consider the precautions specified in the regulations if specified in the Waste Management Act.
glycerol	Consider the precautions specified in the regulations if specified in the Waste Management Act.
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Dispose of the contents containers (in accordance with the relevant laws and regulations).
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Consider the precautions specified in the regulations if specified in the Waste Management Act.
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Consider the precautions specified in the regulations if specified in the Waste Management Act.
2-ethylhexane, rare earth salts	Consider the precautions specified in the regulations if specified in the Waste Management Act.

14. Information required for transportation

A. United Nations No	
2-butanone oxime	1993
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No UN transport hazard classification information
Phthalic acid anhydride	2214
pentaerythritol	No UN transport hazard classification information
IRON OXIDE	No UN transport hazard classification information
CALCITE	No UN transport hazard classification information
talc	No UN transport hazard classification information
glycerol	No UN transport hazard classification information
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No UN transport hazard classification information
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No UN transport hazard classification information
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No UN transport hazard classification information
2-ethylhexane, rare earth salts	No UN transport hazard classification information
B. Proper shipping name	
2-butanone oxime	Flammable liquid, NOS (Titanium Tetraisobutanoate) ()
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	PHTHALIC ANHYDRIDE with more than 0.05% of maleic anhydride
pentaerythritol	Trans-retinal
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable

glycerol	ALUMINUM ZIRCONIUM TETRACHLOHY…
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM…	Not applicable
2-ethylhexane, rare earth salts	Not applicable
C. Risk rating in transportation	
2-butanone oxime	3
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	8
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM…	Not applicable
2-ethylhexane, rare earth salts	Not applicable
D. Courage rating	
2-butanone oxime	III
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	III
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM…	Not applicable
2-ethylhexane, rare earth salts	Not applicable
E. Marine pollutants	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	a non-partisan party
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
F. Special safety measures that users need or need to know about transportation or transportation emergency measures in case of fire	
2-butanone oxime	F-E
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	F-A
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
Emergency measures in case of spill	
2-butanone oxime	S-E
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	S-B
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable

15. Status of legal regulations

A. Regulations under the Occupational Safety and Health Act	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	Hazardous substances subject to management
Phthalic acid anhydride	Substances subject to work environment measurement (measurement cycle: 6 months)
Phthalic acid anhydride	Substances subject to special health examination (diagnostic cycle: 12 months)
Phthalic acid anhydride	Exposure criteria setting substances
pentaerythritol	Exposure criteria setting substances
IRON OXIDE	Hazardous substances subject to management
IRON OXIDE	Exposure criteria setting substances
CALCITE	No data
talc	Prohibited substances (limited to talc containing 1% or more of asbestos under the Chemical Substances Control Act)

talc	Materials subject to work environment measurement (measurement cycle: 6 months of materials subject to work environment measurement)
talc	Substances subject to special health examination (diagnostic cycle: 24 months)
talc	Exposure criteria setting substances
glycerol	Exposure criteria setting substances
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
B. Regulations under the Chemical Substances Control Act	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	Not applicable
glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
C. Regulations under the Dangerous Goods Safety Management Act	
2-butanone oxime	1 000 L of the second petroleum water-insoluble liquid of the fourth class flammable liquid
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	No data
IRON OXIDE	No data
CALCITE	No data
talc	No data
glycerol	Class 4: 3 petroleum products (water-soluble) 4000 liters
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data
D. Regulations under the Waste Management Act	
2-butanone oxime	No data
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	No data
Phthalic acid anhydride	No data
pentaerythritol	designated waste
IRON OXIDE	No data
CALCITE	designated waste
talc	No data

glycerol	No data
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	No data
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	No data
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	No data
2-ethylhexane, rare earth salts	No data

E. Other regulations under domestic and foreign laws

domestic regulation

2-butanone oxime

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy

Phthalic acid anhydride

pentaerythritol

IRON OXIDE

CALCITE

talc

glycerol

Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)

Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...

2-ethylhexane, rare earth salts

Other domestic regulations

2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable

Foreign regulations

US Administrative Information (OSHA Regulations)

2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (CERCLA Regulations)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	2267.995kg 5000lb
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (EPCRA 302)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (EPCRA 304)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable

Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable

2-ethylhexane, rare earth salts	Not applicable
US Management Information (EPCRA 313)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (Rotterdam Convention Material)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (Stockholm Convention Material)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
US Management Information (Montreal's emotional material)	
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable

Phthalic acid anhydride	Not applicable
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
EU classification information (final classification results)	
2-butanone oxime	T; R48/22R43R52-53
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Carc. Cat. 2; R45 - Muta. Cat. 2; R46 - Xn; R65
	Acute Tox. 4 * STOT SE 3 Skin Irrit. 2 Eye Dam. 1 Resp. Sens. 1
Phthalic acid anhydride	Skin Sens. 1
pentaerythritol	Not applicable
IRON OXIDE	Not applicable
CALCITE	Not applicable
talc	Not applicable
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
EU classification information (danger phrases)	
2-butanone oxime	R43, R48/25, R52/53
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	R45, R46, R65
Phthalic acid anhydride	"H302
pentaerythritol	H335
IRON OXIDE	H315
CALCITE	H318
talc	H334
glycerol	H317"
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable
EU classification information (safety equipment)	Not applicable
2-butanone oxime	Not applicable
hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy	Not applicable
Phthalic acid anhydride	Not applicable

pentaerythritol	Not applicable
IRON OXIDE	
CALCITE	S1/2, S25, S36/37, S45, S61
talc	S53, S45
glycerol	Not applicable
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)	Not applicable
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)	Not applicable
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...	Not applicable
2-ethylhexane, rare earth salts	Not applicable

16. Other references

A. Source of data

2-butanone oxime

GESTIS (G. Flashpoint)

NLM (Percutaneous)

IUCLID (Certain Target Organ Toxicity (Repeated Exposure)

NTP (Specific Target Organ Toxicity (Repeated Exposure)

Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)

ECB-ESIS(European chemical Substances Information System)(http://ecb.jrc.it/esis)

ECOTOX Database, EPA(http://cfpub.epa.gov/ecotox)

IUCLID Chemical Data Sheet, EC-ECB

International Chemical Safety Cards(ICSC)(http://www.nihs.go.jp/ICSC)

TOXNET, U.S. National Library of Medicine(http://toxnet.nlm.nih.gov)

The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)

Industrial Addiction Manual, Shingwang Publishing Co., Ltd

Dangerous Goods Information Management System, National Emergency Management Agency (http://hazmat.nema.go.kr)

Chemical Substances Information System, National Academy of Environmental Sciences (http://ncis.nier.go.kr)

hydrogenated heavy naphtha (petroleum), hydrodesulfurized heavy

UNI. AKRON (Melting Point/Frozen Point)

IUCLID (F. Initial Boiling Point and Boiling Point Range)

UNI. AKRON (G. Flash Points)

UNI. AKRON (upper/lower limit of range of flammables or explosions)

IUCLID (C. Steam Pressure)

UNI. AKRON (Tar. Solubility)

IUCLID (B. Specific gravity)

IUCLID (Ger. n-octanol/water distribution coefficient (Kow))

UNI. AKRON (You. Natural Firing Temperature)

IUCLID (Old)

IUCLID (transdermal)

IUCLID (crustacea)

IUCLID (Residual)

Phthalic acid anhydride

ECHA (Original)

ECHA (Color)

pubchem (me. smell)

HSDB (C. Smell threshold)

HSDB (E. Melting Point/Frozen Point)

HSDB (F. Initial Boiling Point and Boiling Point Range)

ICSC (G. Flashpoint)

ICSC (J. Upper/lower limits on the range of flammability or explosion)

HSDB (K. Steam Pressure)

HSDB (Tar. Solubility)

HSDB (wave vapor density)
HSDB (b. specific gravity)
HSDB (Ger. n-octanol/water distribution coefficient (Kow))
ICSC (you. natural ignition temperature)
HSDB (More. Decomposition Temperature)
HSDB (Roe. Viscosity)
HSDB (Mer. Molecular Weight)
ECHA (Old)
HSDB (Percutaneous)
ECHA (Inhalation)
ECHA (Skin Corrosion or Irritation)
ECHA (severe eye damage or irritation)
ECHA (respiratory sensitivity)
ECHA (Growth Cell Mutagenicity)
ECHA (Growth Toxic)
ECHA, HSDB (specific target organ toxicity (1 exposure)
ECHA (Specific Target Organ Toxicity (Repeated Exposure)
ECHA (Fish)
ECHA (crustacea)
ECHA (bird)
ECHA (D. Soil Mobility)
ECHA (E. Other Hazardous Effects)
pentaerythritol
ECHA (Original)
ECHA (Color)
ECHA (B. Smell)
GESTIS(라. pH)
ECHA (Melting Point/Frozen Point)
ECHA (F. Initial Boiling Point and Boiling Point Range)
HSDB (G. Flash Point)
ECHA (I. Flammable (solid, gas)
ECHA (K. Steam Pressure)
ECHA (Tar. Solubility)
GESTIS (wave vapor density)
ECHA (b. weight)
ECHA (Ger. n-octanol/water distribution coefficient (Kow))
ECHA (You. Natural Firing Temperature)
HSDB (More. Decomposition Temperature)
ECHA (Mer. Molecular Weight)
ECHA (Old)
ECHA (Percutaneous)
ECHA (Inhalation)
ECHA (Skin Corrosion or Irritation)
ECHA (severe eye damage or irritation)
ECHA (Skin Sensitivity)
ECHA (Growth Cell Mutagenicity)
ECHA (Growth Toxic)
ECHA (specific target organ toxicity (1 exposure)
ECHA (Specific Target Organ Toxicity (Repeated Exposure)
ECHA (Fish)
ECHA (crustacea)
ECHA (bird)
ECHA (Residual)
ECHA (Degradable)

HSDB (Concentrated)

ECHA (biodegradable)

HSDB (D. Soil Mobility)

ECHA(nature)|ECHA(color)|NIOSH(smell)|ECHA(initial boiling point/freezing point)|ECHA(initial boiling point and range)|ICSC(inflammable (solid, gas))|ECHA(vapor pressure)|ECHA(vapor density)|ECHA(specific gravity)|ECHA(n-octanol/water distribution coefficient (Kow))|ECHA(natural firing temperature)|HSDB(molecular weight)|HSDB(transcending)|ECHA(percutaneous)|ECHA(percussion)|ECHA(intake or irritation of the skin)|ECHA(severe eye damage or irritation)|ECHA(skin irritation)|ECHA(proliferative cell mutagenicity)|ECHA(proliferative toxicity)|ECHA(proliferative toxicity)|ECHA(specific target organ toxicity (one exposure))|ECHA(crustacelet)|ECHA(residual)|ECHA(concentrated soil mobility)|ECHA(other harmful effects)|ECHA(proliferative)

IRON OXIDE

Chemical book (Mer. molecular weight)

CALCITE

QSAR (Fish)

QSAR (crustacea)

QSAR (algae)

QSAR (Concentrated)

talc

HSDB (Constitution)

HSDB (Color)

HSDB (B. Smell)

ECHA (Melting Point/Frozen Point)

ECHA (K. Steam Pressure)

ECHA (Tar. Solubility)

ECHA (wave vapor density)

HSDB (b. specific gravity)

ECHA (Ger. n-octanol/water distribution coefficient (Kow))

HSDB (Mer. Molecular Weight)

ECHA (Old)

ECHA (Percutaneous)

ECHA (Inhalation)

ECHA (Skin Corrosion or Irritation)

ECHA (severe eye damage or irritation)

ECHA (Skin Sensitivity)

ECHA (Growth Cell Mutagenicity)

ECHA (Growth Toxic)

ECHA (specific target organ toxicity (1 exposure)

ECHA (Specific Target Organ Toxicity (Repeated Exposure)

ECHA (Fish)

ECHA (crustacea)

ECHA (bird)

ECHA (Residual)

ECHA (Concentrated)

ICSC (nature)|ICSC (color)|HSDB (smell)|ICSC (melting point/frozen point)|HSDC (specific gravity)|QSAR (n-octanol/water distribution coefficient (Kow))|Chemical book|RTECS (molecular weight)|HSDB (proliferative cell mutagenicity)|HSDB (proliferative toxicity)|ICSC, HSDB (specific target organ toxicity (one exposure))|HSDB (specific target organ toxicity (repeated exposure))

glycerol

ECHA (Original)

ECHA (B. Smell)

HSDB(라. pH)

ECHA (Melting Point/Frozen Point)

ECHA (F. Initial Boiling Point and Boiling Point Range)

ECHA (G. Flashpoint)

ECHA (I. Flammable (solid, gas)

ECHA (K. Steam Pressure)

ECHA (Tar. Solubility)

ECHA (wave vapor density)

GESTIS (b. weight)
ECHA (Ger. n-octanol/water distribution coefficient (Kow))
ECHA (You. Natural Firing Temperature)
HSDB (More. Decomposition Temperature)
ECHA (R.Viscosity)
GESTIS (Mer. Molecular Weight)
ECHA (Old)
ECHA (Percutaneous)
ECHA (Inhalation)
ECHA (Skin Corrosion or Irritation)
ECHA (severe eye damage or irritation)
ECHA (Growth Cell Mutagenicity)
ECHA (Growth Toxic)
ECHA (specific target organ toxicity (1 exposure)
ECHA (Specific Target Organ Toxicity (Repeated Exposure)
ECHA (Fish)
ECHA (crustacea)
ECHA (bird)
ECHA (Residual)
ECHA (Degradable)
HSDB (Concentrated)
ECHA (biodegradable)
Fatty acids, vegetable-oil (FATTY ACIDS, VEGETABLE-OIL)
Polyethylene, oxidized (POLYETHYLENE, OXIDIZED)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(성상)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(색상)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(나. 냄새)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(마. 녹는점/어는점)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(사. 인화점)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(하. 비중)
Corporate Solution From Thomson Micromedex(http://csi.micromedex.com)(너. 자연발화온도)
Quaternary ammonium compounds, bis (hydrogenated resin alkyl) dimethyl, salt with bentonite (QUATERNARY AMMONIUM...
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(성상)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(카. 증기압)
OECD Screening Information Data Set (http://cs3-hq.oecd.org/scripts/hpv/)(, information on most likely exposure routes)
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(경구)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(흡입)
SIDS (Skin Corrosion or Irritation)
SIDS (severe eye damage or irritation)
SIDS (Skin Sensitivity)
SIDS (Specific Target Organ Toxicity (Repeated Exposure)
Seton compliance resource center(http://www.setonresourcecenter.com/MSDSs)
2-ethylhexane, rare earth salts
Guidechem (nature)
Guidechem (F. Initial Boiling Point and Boiling Point Range)
Guidechem (G. Flashpoint)
Guidechem (Tar. Solubility)
Guidechem (B. Specific gravity)
Guidechem (Ger. n-octanol/water distribution coefficient (Kow))
ChemIDplus (mer. molecular weight)
Guidechem (residual)

B. Date of initial preparation 2024-09-04
C. Number of revisions and last revision date

Number of revisions

Last revision date

D. Other

" ○ Material safety data (MSDS) has been edited and partially modified by referring to MSDS provided by the Korea Occupational Safety and Health Agency
It's data."