물질안전보건자료
(Material Safety Data Sheet)

Name of the product	KUT570(A)-GREY

1. Information about chemicals and companies

A. Product name	KUT570(A)-GREY
B. Recommended use of the product and restriction	
Recommended use of the product	general industrial paint
Product usage restrictions	Do not use anything other than the intended use.
C. Supplier information (in case of imported goods, enter information of domestic suppliers that can be contacted urgently)	
Corporate name	Geumgang Paint Industrial Co., Ltd.
Address	454-2 Yongjeon-ri, Gokyeong-myeon, Yeongcheon-si, Gyeongsangbuk-do
Emergency phone number	054 338 7722

2. Hazardousness/Dangerousness

2. Hazardousness/Dangerousness	2. Hazardous and dangerous flammable liquids: classification 2 Self-heating substances and mixtures: Classification 1 Acute Toxicity (percutaneous): Classification 4 Corrosive/Skin irritation: Classification 2 Severe eye damage/eye irritation: Classification 2 (2A/2B) Carcinogenicity: Classification 2 Specific target organ toxicity (1 exposure): Classification 3 (anesthetic effect) Specific target organ toxicity (1 exposure): Classification 3 (anesthetic effect) Specific target organ toxicity (1 exposure): classification 3 (respiratory irritation) Specific targeted organ toxicity (repeated exposure): Classification 1 Inhalation hazard: classification 1
B. Warning signs including precautionary phrases	
Picture characters	
a sign language	Dangers
Hazardous/dangerous phrases	H225 High-Tolerance Liquids and Vapor H251 Self-heating: May cause fire H304 If swallowed and introduced into the airways, it can be fatal H312 Harmful to contact with skin H315 Causes irritation to the skin H319 Severe irritation to the eyes H335 May cause respiratory irritation H336 May cause drowsiness or dizziness H351 Suspected to cause cancer (State the exposure pathway that causes cancer; however, this is limited to cases where there is conclusive evidence that it does not cause cancer by other exposure pathways.) H372 The exposure pathway that causes damage to the organ (specify all organs known to be affected by long-term or repeated exposure) (specify specific targeted organ toxicity (repeated exposure) is described; provided, however, that there is conclusive evidence that other exposure pathways do not cause specific targeted organ toxicity (repeated exposure)
Precautionary phrases	
Prevention	Get a P201 pre-use manual. P202 Do not handle all safety precautions until you have read and understood them. P210 Keep away from heat, high temperature surfaces, sparks, flames and other ignition sources. No smoking
Prevention	P233 Securely seal the container. Keep P235 low temperature.

	Ground the P240 container and the accommodation facility.
	Use the P241 explosion proof type [electricity/ventilation/lighting/…] facility.
	Use a tool that does not produce a P242 spark.
	P243 Take antistatic measures.
	P260 Do not inhale dust/fume/gas/mist/steam/spray.
	P261 Avoid inhalation of dust/fume/gas/mist/steam/spray.
	After handling P264 thoroughly wash….
	P270 Do not eat, drink or smoke when using this product.
	P271 Handle outdoors or only in well-ventilated areas.
	P280 Wear protective gloves/protective/safety glasses/facial protective equipment.
Response	If you swallowed P301+P310: See a medical institution/doctor immediately.
	P302+P352 If you get it on your skin: Wash with plenty of water.
	P303+P361+P353 If you get it on your skin (or hair): Remove all contaminated clothing immediately. Wash your skin with water [or take a shower].
	If you inhale P304+P340: Transfer to a place with fresh air and relax in an easy-to-breathe position.
	P305+P351+P338 If it gets on your eyes: Wash carefully with water for a few minutes. Remove contact lenses if possible. Keep washing.
	P308+P313 If exposed or concerned about exposure: Get medical action/advice.
	P312 If you feel uncomfortable, see a medical institution/doctor/.
	P314 Get medical action/advice if you feel uncomfortable.
	P321 … take care of it.
	P331 Don't make me vomit.
	P332+P313 If skin irritation occurs: Get medical action/advice.
	P337+P313 If eye irritation persists: Get medical action/advice.
	P362+P364 Take off contaminated clothing and clean it before use again.
	P370+P378 In the event of a fire: Use proper equipment to extinguish the fire.
Storage	P403+P233 Store in a well ventilated place. Seal the container tightly.
	P403+P235 Keep in a well ventilated place. Keep low temperature.
	Save with P405 lock.
	Keep the gap between the P407 loadings or pallets.
	P410 Avoid direct sunlight.
	P413 It is a highly reactive material, so if you store it above kg, make sure not to exceed…℃.
	P420 Isolated and stored.
Disposal	Dispose of contents/containers in accordance with P501 waste related laws

3. Name and content of components

Material name	Nomenclature (tolerance)	CAS number	content (%)
carbon black		1333-86-4	0.1-2
titanium dioxide		13463-67-7	19-27
butyl acetate	Normal-butyl acetate	123-86-4	0.1-3
	n-butyl acetate		
xylene	Xylene (Orto, Meta, Parai)	1330-20-7	28-36
	Dimethylbenzene (Osso, Metha, Para-isomer)		
	Xylene, o,m,p-isomers		
	Xylene(o,m,p-isomers)		
ethylbenzene	ethyl benzene	100-41-4	2-7
	Ethyl benzene		
propylene glycol monomethyl ether acetic acid	1-메톡시-2-프로판올 아세트산(1-METHOXY-2-PROPANOL ACETATE);	108-65-6	3-10
resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	친유기성 점토(ORGANOPHILIC CLAY);	68953-58-2	0.1-1
dibutyl dirorinate	디뷰틸비스((1-옥소도데킬)옥시)주석 (DIBUTYLBIS((1-OXODODECYL)OXY)STANNANE);	77-58-7	0 -0.02
2-Ethylhexanoic acid zinc salt		136-53-8	0.01-0.5

4. First-aid measures

A. When it gets into my eyes	Immediately wash your eyes with running water for at least 20 minutes when contacting substances
	Take medical action immediately
	Get emergency medical attention
	Immediately wash your skin and eyes with running water for at least 20 minutes when contacting substances
	Wash it carefully with water for a few minutes if it gets on your eyes. Remove contact lenses, if possible. Keep washing.
	Seek medical action and advice if eye irritation persists.
B. When it comes into contact with the skin	Immediately wash the skin with running water for at least 20 minutes when contacting substances
	Remove and isolate contaminated clothes and shoes
	Wash clothes and shoes thoroughly before reuse
	Take medical action immediately
	If it is a hot substance, soak or wash the affected area in a large amount of cold water to remove heat
	Get emergency medical attention
	Remove contaminated clothes and shoes and isolate contaminated areas
	Immediately wash your skin and eyes with running water for at least 20 minutes when contacting substances
	Prevent the spread of contaminated areas in the event of minor skin contact
	In case of burns, immediately cool the area with cold water as long as possible and do not remove clothes that stick to the skin
	Wash your skin with soap and water
	Get help from a medical professional when removing molten material from the skin
	Take off or remove any contaminated clothing if it gets on your skin (or hair). Wash/shower your skin with water.
	Take off all contaminated clothing if it gets on your skin (or hair). Wash/shower your skin with water.
	If you feel uncomfortable, see a medical institution (doctor).
	Get medical action/advice if you feel uncomfortable.
	Seek medical action and advice if skin irritation occurs.
	Seek medical action and advice if you experience skin irritation or erythema.
	Take off the contaminated clothing.
	Wash contaminated clothing before re-use.
C. When you inhale it	Get emergency medical attention
	Move to a place where there is fresh air
	If you are not breathing, perform artificial respiration
	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 a cough or other symptoms.
	Move to a place where there is fresh air
	Get emergency medical attention
	If you are not breathing, perform artificial respiration
	If you have difficulty breathing, supply oxygen
	Keep it warm and stable
	Seek medical action and advice if exposed or concerned about exposure.
	If you are exposed or concerned about exposure: Get medical action/advice.
	If you feel exposed or uncomfortable, see a medical institution (doctor).
	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 emergency medical attention

	If you eat or inhale substances, do not perform artificial respiration using the oral cavity method and use appropriate breathing equipment
	If you swallowed it, see a medical institution (doctor) immediately.
	Seek medical action and advice if exposed or concerned about exposure.
	If you are exposed or concerned about exposure: Get medical action/advice.
	If you feel exposed or uncomfortable, see a medical institution (doctor).
	Don't make me vomit.
E. Other precautions for doctors	Let medical personnel know about the material and take protective measures
	Contact medical staff in case of disclosure 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 fires: dry sands, chemical agents, alcohol-resistant foam, water spray, general foam, CO2 (appropriate extinguishing agents)
	Large fire: water spray/fog, normal foam (appropriate extinguishing agent)
	High-pressure drinking water (inappropriate digestive medicine)
	Use alcohol foam, carbon dioxide or water spray when extinguishing this substance
	Use dry sand or soil when suffocating
B. Certain hazards arising from chemical substances	
certain hazards arising from chemicals	Can be ignited by heat, spark and flame
	Containers may explode when heated
	Some may burn, but will not ignite easily
	Can produce irritating, toxic gases in case of fire
	Inhalation of substances may be harmful
	Some liquids may cause dizziness and asphyxiation
	Can decompose at high temperatures to produce toxic gases
	Instability at room temperature
	Fierce polymerization can cause fire and explosion
	Steam can be transferred to the ignition source and ignited
	Irritating and highly toxic gases can be generated by pyrolysis or combustion during burning
	Can form explosive mixtures at flashpoint or above
	Containers may explode when heated
	High resolution: easily ignited by heat, spark, flame
	Leaks are at risk of fire/explosion
	Can be ignited by friction, heat, spark, or flame
	Powder, dust, crumbs, perforation, shelves, cutting, etc. can explode or burn explosively
	Reignition after digestion
	Risk of steam explosion indoors, outdoors, and in sewers
	flammable/combustible substances
	Some substances can burn quickly with flashes of light
	Some may burn, but will not ignite easily
	Steam can form an explosive mixture with air
	Steam can move to the ignition source and flash back
	Some may produce combustible hydrogen gas when in contact with metal
	Non-fungible and non-combustible materials themselves may not burn, but may decompose during heating to cause corrosive/toxic fumes
	Some may ignite combustible substances with oxidizing agents
	Toxicity: Inhalation, ingestion, and skin contact can cause serious injury and death
	Contact with molten material can cause serious burns to the skin and eyes
	Can cause skin and eyes to burn upon contact

Steam can cause dizziness or suffocation without awareness

Can produce irritating, toxic gases in case of fire

Can produce irritating, corrosive and toxic gases in case of fire

Inhalation and contact irritates or burns the skin and eyes

Inhalation and skin absorption may be toxic

High-tolerance liquids and vapors

Flammable liquids and vapors

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

carbon black

Rescuers should wear appropriate protective gear.

Keep a safe distance out of the area and digest it

Be careful because it may be melted and transported at a temperature above the flash point

Cool the container with a large amount of water even after extinguishing the fire in the tank

If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately

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

In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn

titanium dioxide

Rescuers should wear appropriate protective gear.

Keep a safe distance out of the area and digest it

Please be careful because it may be melted and transported

Dig a ditch for the disposal of the fire-extinguishing water and keep the material from dispersing

If it's not dangerous, move the containers out of the fire zone

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

Cool the container with a large amount of water even after extinguishing the fire in the tank

If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately

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

In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn

butyl acetate

Rescuers should wear appropriate protective gear.

Keep a safe distance out of the area and digest it

Most of them are lighter than water, so be careful

Since most vapors are heavier than air, they may spread along the ground and accumulate in low-lying areas or confined spaces

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

Cool the container with a large amount of water even after extinguishing the fire in the tank

If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately

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

In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn

xylene

Rescuers should wear appropriate protective gear.

Keep a safe distance out of the area and digest it

Most of them are lighter than water, so be careful

Since most vapors are heavier than air, they may spread along the ground and accumulate in low-lying areas or confined spaces

If it's not dangerous, move the containers out of the fire zone

xylene

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

Cool the container with a large amount of water even after extinguishing the fire in the tank

If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately

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

ethylbenzene	In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn Rescuers should wear appropriate protective gear. Keep a safe distance out of the area and digest it Most of them are lighter than water, so be careful Since most vapors are heavier than air, they may spread along the ground and accumulate in low-lying areas or confined spaces In case of a tank fire, extinguish it at the maximum distance or use unmanned fire extinguishing equipment Cool the container with a large amount of water even after extinguishing the fire in the tank If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately In the event of a tank fire, step away from the tank engulfed in flames
propylene glycol monomethyl ether acetic acid	In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn Rescuers should wear appropriate protective gear. Keep a safe distance out of the area and digest it Most of them are lighter than water, so be careful Since most vapors are heavier than air, they may spread along the ground and accumulate in low-lying areas or confined spaces If it's not dangerous, move the containers out of the fire zone Do not pour directly into exposed sources or safety devices as they may freeze in case of a tank fire In case of a tank fire, extinguish it at the maximum distance or use unmanned fire extinguishing equipment Cool the container with a large amount of water even after extinguishing the fire in the tank If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately In the event of a tank fire, step away from the tank engulfed in flames
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn Rescuers should wear appropriate protective gear. Keep a safe distance out of the area and digest it Please be careful because it may be melted and transported Dig a ditch for the disposal of the fire-extinguishing water and keep the material from dispersing If it's not dangerous, move the containers out of the fire zone In case of a tank fire, extinguish it at the maximum distance or use unmanned fire extinguishing equipment Cool the container with a large amount of water even after extinguishing the fire in the tank If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately In the event of a tank fire, step away from the tank engulfed in flames
dibutyl dirorinate	In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn Rescuers should wear appropriate protective gear. Keep a safe distance out of the area and digest it Dig a ditch for the disposal of the fire-extinguishing water and keep the material from dispersing If it's not dangerous, move the containers out of the fire zone In case of a tank fire, extinguish it at the maximum distance or use unmanned fire extinguishing equipment Keep water out of the container Cool the container with a large amount of water even after extinguishing the fire in the tank If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately In the event of a tank fire, step away from the tank engulfed in flames
2-Ethylhexanoic acid zinc salt	Rescuers should wear appropriate protective gear.

2-Ethylhexanoic acid zinc salt	Keep a safe distance out of the area and digest it
	Please be careful because it may be melted and transported
	Some may be transported at high temperatures, so be careful
	Dig a ditch for the disposal of the fire-extinguishing water and keep the material from dispersing
	If it's not dangerous, move the containers out of the fire zone
	In case of a tank fire, extinguish it at the maximum distance or use unmanned fire extinguishing equipment
	Cool the container with a large amount of water even after extinguishing the fire in the tank
	If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately
	In the event of a tank fire, step away from the tank engulfed in flames
	In case of large-scale fire in the event of a tank fire, use unmanned fire extinguishing equipment, and if it is impossible, back off and let it burn
polyurethane	If it's not dangerous, move the containers out of the fire zone
	Some may be transported at high temperatures
	Leaks may cause contamination
	Can cause skin and eyes to burn upon contact
	Dig a ditch for the disposal of the fire-extinguishing water and keep the material from dispersing
	If it's not dangerous, move the containers out of the fire zone
	Cool the container with a large amount of water even after extinguishing the fire in the tank
	If there is a high note from the pressure emitter in case of a tank fire, or if the tank is discolored, step back immediately
	In the event of a tank fire, step away from the tank engulfed in flames

6. How to deal with leaks

A. Measures and protective equipment necessary to protect the human body	Remove all ignition sources
	If it's not dangerous, stop the leak
	Pay attention to the substances and conditions to avoid
	Ventilate the contaminated area
	Do not touch or walk around exposed objects
	Prevent dust formation
	Remove all ignition sources as very fine particles can cause fire or explosion.
	Clean the spilt immediately and follow the precautions in the protective gear.
	Isolate the contaminated area.
	Do not allow anyone who does not need to enter or does not have protective equipment.
	Do not touch or walk around exposed objects
	Remove all ignition sources
	Be sure to ground all equipment when handling materials
	If it's not dangerous, stop the leak
	Do not wear appropriate protective clothing and do not touch damaged containers or spills
	Steam suppression foam can be used to reduce steam generation
	Keep water out of the container
	Cover with plastic sheets to prevent spread
	Prevent dust formation
	Pay attention to the substances and conditions to avoid
	Do not inhale dust/fume/gas/mist/steam/spray.
	Avoid inhalation of dust, fumes, gases, mists, steam, spray.
B. Measures necessary to protect the environment	Prevent inflows into waterways, sewers, cellars, and enclosed spaces
	Leaks are corrosive/toxic and may cause contamination
	Leaks may cause contamination
	Prevent the inflow into waterways, sewers, cellars, and enclosed spaces in case of large leaks
	Prevent inflows into waterways, sewers, cellars, and enclosed spaces

C. Purification or removal method	Do not discharge into the environment. In case of minor leakage, wash the contaminated area with a large amount of water In case of minor leakage, absorb it with sand and non-combustible materials and place it in a container Make a ditch away from liquid spills in case of large leaks Place the leak in a clean, dry container with a clean shovel, close it loosely, and move the container away from the leak area Cover with a plastic sheet to prevent diffusion and keep it dry in case of powder leakage Build an embankment 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 air dust and wet it with water to prevent it from dispersing. Absorb the liquid and wash off the contaminated area with detergent and water. In case of large leaks, make a ditch away from liquid leaks If a large amount of leakage occurs, wet it with water, dig a ditch, and dispose of it later Use a clean explosion-proof tool to collect any absorbed material Place the leak in a clean, dry container with a clean shovel, close it loosely, and move the container away from the leak area Cover with a plastic sheet to prevent diffusion and keep it dry in case of powder leakage In case of minor leakage, absorb it with sand and non-combustible materials and place it in a container Collect the leak.

7. How to handle and store

A. Tips for handling safety	Pay attention to the substances and conditions to avoid Wash thoroughly after handling Work with reference to engineering care and personal protective equipment Be careful of high temperatures Do not apply pressure, cut, weld, solder, join, pierce, polish or expose to heat, expose to flames, sparks, static electricity or other sources of ignition. Follow all MSDS/label precautions as product debris may remain after the container has been emptied. Use carefully when handling/storing. Carefully open the cap before opening. Prevent long-term or continuous skin contact. Do not breathe steam from heated material. Do not enter the storage area without adequate ventilation. Be sure to ground all equipment when handling materials Pay attention to the substances and conditions to avoid Pay attention to the substances and conditions to avoid Work with reference to engineering care and personal protective equipment Be careful of high temperatures Be careful because it may explode during dust generation or friction work Measure and ventilate the oxygen concentration in the air while working because there is a risk of oxygen deficiency when working in a low-lying confined space Do not handle all safety precautions until you have read and understood them. Use electricity, ventilation, lighting, and equipment to prevent explosions. Use only non-sparking tools. Take anti-static measures. Avoid inhalation of dust, fumes, gases, mists, steam, spray. Wash the handling area thoroughly after handling. wash thoroughly after handling. Do not eat, drink or smoke when using this product. Do not eat, drink or smoke when using this product. Handle outdoors or only in well-ventilated areas.

B. Safe storage method	Do not take contaminated clothing out of the workplace.
	Keep it sealed
	Store in a cool, dry place
	Pay attention to the substances and conditions to avoid
	Drain the empty drum completely and block it properly, immediately return it to the drum regulator or place it properly.
	Keep away from food and drinks.
	Pay attention to the substances and conditions to avoid
	Stay away from heat, spark, flame, high heat - no smoking
	Keep at low temperature and avoid direct sunlight.
	Store containers tightly sealed in a well-ventilated place.
	Store in a well ventilated place and keep low temperature.
	Store in a locked storage area.
	Save it with a lock.
	Keep a gap between the cargoes.
	Be careful not to exceed (...)℃ when storing more than (...)kg because it is a highly reactive substance.
	Store in isolation from other substances.

8. Anti-exposure and personal protective equipment

A. Chemical exposure standards, biological exposure standards, etc

domestic regulations	
carbon black	TWA - 3.5mg/m3 Carcinogenic 2, Inhalation (Notification No. 2020-48)
titanium dioxide	TWA - 10 mg/m3 Carcinogenic 2
butyl acetate	TWA - 150ppm STEL - 200ppm
xylene	TWA - 100ppm STEL - 150ppm
ethylbenzene	TWA - 100ppm STEL - 125ppm
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	TWA - 0.1 mg/m3 tin (organic compounds)
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
ACGIH Regulations	
carbon black	TWA 3 ㎎/㎥
titanium dioxide	TWA 10 ㎎/㎥
butyl acetate	TWA 50 ppm
butyl acetate	STEL 150 ppm
xylene	STEL 150 ppm
xylene	TWA 100 ppm
ethylbenzene	TWA 20 ppm
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	STEL 0.2 ㎎/㎥
dibutyl dirorinate	TWA 0.1 ㎎/㎥
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
Biological exposure standards	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	0.15 g/g creatinine Medium: urine Time: end of shift Parameter: Sum of mandelic acid and phenylglyoxylic acid (nonspecific)

propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
Other exposure standards	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
B. Appropriate engineering management	Process isolation, use local exhaust or keep the air level below the exposure limit
B. Appropriate engineering management	Process isolation, local exhaust, or other engineering management to adjust the air level below the exposure limit.
B. Appropriate engineering management	If dust, fume or mist is generated when driving, ventilate air pollution to be kept below the exposure limit
B. Appropriate engineering management	Facilities that store or use this material should be equipped with a face wash facility and a safety shower.
C. Personal protective equipment	
respiratory protection	
carbon black	Carcinogenic 2, inhalation (Notification No. 2020-48)
carbon black	Wear respiratory protection certified by the Korea Occupational Safety and Health Agency to suit the physicochemical properties of exposed particulate matter
carbon black	If the exposure concentration is lower than 35 mg/m3, wear the appropriate type of filter while wearing the type of respirator
carbon black	Wear a loose-fitting hood/helmet electric respirator or continuous flow dust mask with an appropriate type of filter if the exposure concentration is lower than 87.5 mg/m3
carbon black	If the exposure concentration is lower than 175 mg/m3, wear a front or electric or air-supplied continuous flow/pressure-required respirator with an appropriate filter
carbon black	If the exposure concentration is lower than 3500 mg/m3, wear a front type with an appropriate filter or helmet/hood type, pressure-requested air supply mask
carbon black	If the exposure concentration is lower than 35000 mg/m3, wear a self-supplied air supply (SCBA) or pressure-required self-supplied air supply (SCBA) respirator with the appropriate filter
titanium dioxide	Carcinogenic 2
titanium dioxide	Wear respiratory protection certified by the Korea Occupational Safety and Health Agency to suit the physicochemical properties of exposed particulate matter
titanium dioxide	If the exposure concentration is lower than 100 mg/m3, wear the appropriate type of filter while wearing the type of respirator
titanium dioxide	Wear a loose-fitting hood/helmet electric respirator or continuous flow dust mask with an appropriate type of filter if the exposure concentration is lower than 250 mg/m3
titanium dioxide	If the exposure concentration is lower than 500mg/m3, wear a front or electric or air-supplied continuous flow/pressure-required respirator with the appropriate filter
titanium dioxide	If the exposure concentration is lower than 10000mg/m3, wear a front type with an appropriate filter or helmet/hood type, pressure-requested air supply mask

titanium dioxide	If the exposure concentration is lower than 100000 mg/m3, wear a self-supplied air-supplied (SCBA) or pressure-required self-supplied air-supplied (SCBA) respirator with the appropriate filter
butyl acetate	Wear a Korea Occupational Safety and Health Agency-certified respiratory protection suitable for exposed gas/liquid physicochemical characteristics
butyl acetate	If the exposure concentration is lower than 1500 ppm, wear a type respirator while installing an appropriate filter or purification tank
butyl acetate	If the exposure concentration is lower than 3750 ppm, wear a loose-fitting hood/helmet electric respirator or a continuous flow dust mask/gas mask (the dust mask is only for liquid aerosols)
butyl acetate	If the exposure concentration is lower than 7500 ppm, wear a front or electric or air-supplied continuous flow/pressure-required respirator with an appropriate filter or purification tank
butyl acetate	If the exposure concentration is lower than 150000ppm, wear a front type or helmet/hood type with appropriate filter or purification tank, pressure-requested air supply mask
butyl acetate	If the exposure concentration is lower than 1500000ppm, wear a self-supplied air supply (SCBA) or pressure-required self-supplied air supply (SCBA) respirator with an appropriate filter or purification tank
xylene	Wear a Korea Occupational Safety and Health Agency-certified respiratory protection suitable for exposed gas/liquid physicochemical characteristics
xylene	If the exposure concentration is lower than 1000 ppm, wear a type of respirator while installing an appropriate filter or purification tank
xylene	If the exposure concentration is lower than 2500 ppm, wear a closed-fitting hood/helmet electric respirator equipped with an appropriate filter or purification tank or a continuous flow dust mask/gas mask (the dust mask is only for liquid aerosols)
xylene	If the exposure concentration is lower than 5000 ppm, wear a front or electric or air-supplied continuous flow/pressure-required respirator with an appropriate filter or purification tank
xylene	If the exposure concentration is lower than 100000ppm, wear a front type or helmet/hood type with appropriate filter or purification tank, pressure-requested air supply mask
xylene	If the exposure concentration is lower than 1000000ppm, wear a self-supplied air supply (SCBA) or pressure-required self-supplied air supply (SCBA) respirator with an appropriate filter or purification tank
ethylbenzene	Wear a Korea Occupational Safety and Health Agency-certified respiratory protection suitable for exposed gas/liquid physicochemical characteristics
ethylbenzene	If the exposure concentration is lower than 1000 ppm, wear a type of respirator while installing an appropriate filter or purification tank
ethylbenzene	If the exposure concentration is lower than 2500 ppm, wear a closed-fitting hood/helmet electric respirator equipped with an appropriate filter or purification tank or a continuous flow dust mask/gas mask (the dust mask is only for liquid aerosols)
ethylbenzene	If the exposure concentration is lower than 5000 ppm, wear a front or electric or air-supplied continuous flow/pressure-required respirator with an appropriate filter or purification tank
ethylbenzene	If the exposure concentration is lower than 100000ppm, wear a front type or helmet/hood type with appropriate filter or purification tank, pressure-requested air supply mask
ethylbenzene	If the exposure concentration is lower than 1000000ppm, wear a self-supplied air supply (SCBA) or pressure-required self-supplied air supply (SCBA) respirator with an appropriate filter or purification tank
propylene glycol monomethyl ether acetic acid	Wear respirator certified by the Occupational Safety and Health Agency to suit the physicochemical characteristics of the exposed gas/liquid
propylene glycol monomethyl ether acetic acid	"For gaseous/liquid substances, the following respiratory protection is recommended - Isolated front-type gas mask (for organic compounds (for acid gases) or isolation-type gas mask (for organic compounds (for acid gases) or direct-type front-type gas mask (for organic compounds (for acid gases) or other-type gas mask (for organic compounds (for acid gases)) or electric gas mask"
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	If oxygen is low (<19.5%), wear an air mask or self-sufficient air sign inhaler

Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Wear respirator certified by the Occupational Safety and Health Agency to suit the physicochemical properties of the particulate matter exposed
dibutyl dirorinate	"For particulate matter, the following respiratory protection is recommended
dibutyl dirorinate	– Face filter dust mask or air filter dust mask (high efficiency particulate filter) or electric fan attached dust mask (dust, mist, fume filter) "
dibutyl dirorinate	Tin (organic compounds)
dibutyl dirorinate	Wear a Korea Occupational Safety and Health Agency–certified respiratory protection suitable for exposed gas/liquid physicochemical characteristics
dibutyl dirorinate	If the exposure concentration is lower than 1 mg/m3, wear a respirator while installing an appropriate filter or purification tank
dibutyl dirorinate	If the exposure concentration is lower than 2.5 mg/m3, wear a loose–fitting hood/helmet type electric respirator equipped with an appropriate filter or purification tank or a continuous flow dust mask/gas mask (the dust mask is only for liquid aerosols)
dibutyl dirorinate	If the exposure concentration is lower than 5 mg/m3, wear a front or electric or air–supplied continuous flow/pressure–required respirator equipped with an appropriate filter or purification tank
2–Ethylhexanoic acid zinc salt	If the exposure concentration is lower than 100mg/m3, wear a front or helmet/hood type with an appropriate filter or purification container, and a pressure–requested air supply mask
2–Ethylhexanoic acid zinc salt	If the exposure concentration is lower than 1000mg/m3, wear a self–supplied air supply (SCBA) or pressure–required self–supplied air supply (SCBA) respirator with an appropriate filter or purification tank
2–Ethylhexanoic acid zinc salt	Wear respirator certified by the Occupational Safety and Health Agency to suit the physicochemical characteristics of the exposed gas/liquid
polyurethane	"For gaseous/liquid substances, the following respiratory protection is recommended
polyurethane	– Isolated front–type gas mask (for organic compounds (for acid gases) or isolation–type gas mask (for organic compounds (for acid gases) or direct–type front–type gas mask (for organic compounds (for acid gases) or other–type gas
polyurethane	If oxygen is low (<19.5%), wear an air mask or self–sufficient air sign inhaler
polyurethane	If you are low on oxygen (<19.6%), wear an air freshener, or self–contained respirator
eye protection	Wear breathable goggles to protect your eyes against any particulate matter that may irritate your eyes or cause other health problems
eye protection	Install emergency cleaning facilities (shower) and wash facilities in an easy–to–reach location for workers
eye protection	Wear safety glasses or breathable goggles to protect your eyes from vaporized organic substances that cause eye irritation or other health problems
eye protection	Install emergency cleaning facilities (shower) and wash facilities in an easy–to–reach location for workers
eye protection	Wear breathable eyeglasses to protect your eyes against any particulate matter that may irritate your eyes or cause other health problems
eye protection	Install emergency cleaning facilities (shower) and wash facilities in an easy–to–reach location for workers
eye protection	Wear eye glasses or breathable eye glasses to protect your eyes from vaporized organic substances that cause eye irritation or other health problems
eye protection	Install emergency cleaning facilities (shower) and wash facilities in an easy–to–reach location for workers
eye protection	Wear the following safety glasses that may irritate the eyes or cause other health problems. – Closed safety glasses for gaseous organic matter – Safety glasses for vaporized organic matter or breathable safety glasses – Air–permeable safety glasses for particulate matter
eye protection	Install emergency cleaning facilities (shower) and wash facilities in an easy–to–reach location for workers
Hand protection	Wear protective gloves of appropriate material in consideration of the physical and chemical properties of the chemicals
protection of the body	Wear appropriate protective clothing in consideration of the physical and chemical properties of the chemicals

9. physicochemical properties

A. Appearance

the image of a person	Liquid
Color	Colored colors
B. Smell	No data
C. The threshold of smell	No data
D. pH	No data
E. the melting point/freezing point	No data
F. Initial boiling point and range of boiling points	No data
G. A flashpoint	No data
H. Evaporation rate	No data
I. Inflammable (solid, gas)	No data
J. Upper/lower limits of flammable or explosive range	No data
C. Steam pressure	No data
Ta. Solubility	No data
F. Vapor density	No data
Ha. Specific gravity	0.9-1.3
G. N-octanol/water distribution coefficient (Kow)	No data
You. Natural ignition temperature	No data
More. Resolution temperature	No data
D. Viscosity	50-70
Mer. Molecular weight	No data

10. Stability and reactivity

A. Chemical stability and the possibility of adverse reactions

carbon black	Can decompose at high temperatures to produce toxic gases
carbon black	Instability at room temperature
carbon black	Can be ignited by friction, heat, spark, or flame
carbon black	Powder, dust, crumbs, perforation, shelves, cutting, etc. can explode or burn explosively
carbon black	Reignition after digestion
carbon black	flammable/combustible substances
carbon black	Some substances can burn quickly with flashes of light
carbon black	Contact with molten material can cause serious burns to the skin and eyes
carbon black	Can cause skin and eyes to burn upon contact
carbon black	Can produce irritating, toxic gases in case of fire
titanium dioxide	Can decompose at high temperatures to produce toxic gases
titanium dioxide	Containers may explode when heated
titanium dioxide	Some may burn, but will not ignite easily
titanium dioxide	Non-fungible and non-combustible materials themselves may not burn, but may decompose during heating to cause corrosive/toxic fumes
butyl acetate	Flammable liquids and vapors
butyl acetate	Fierce polymerization can cause fire and explosion
butyl acetate	Can form explosive mixtures at flashpoint or above
butyl acetate	Containers may explode when heated
butyl acetate	High resolution: easily ignited by heat, spark, flame
butyl acetate	Leaks are at risk of fire/explosion
butyl acetate	Risk of steam explosion indoors, outdoors, and in sewers
butyl acetate	Steam can form an explosive mixture with air
butyl acetate	Steam can move to the ignition source and flash back
butyl acetate	Can produce irritating, corrosive and toxic gases in case of fire
butyl acetate	Inhalation and skin absorption may be toxic
xylene	High-tolerance liquids and vapors
xylene	Fierce polymerization can cause fire and explosion
xylene	Can form explosive mixtures at flashpoint or above
xylene	Containers may explode when heated
xylene	High resolution: easily ignited by heat, spark, flame

xylene	Leaks are at risk of fire/explosion
xylene	Risk of steam explosion indoors, outdoors, and in sewers
xylene	Steam can form an explosive mixture with air
xylene	Steam can move to the ignition source and flash back
xylene	Steam can cause dizziness or suffocation without awareness
xylene	Can produce irritating, corrosive and toxic gases in case of fire
xylene	Inhalation and contact irritates or burns the skin and eyes
xylene	Inhalation and skin absorption may be toxic
ethylbenzene	High-tolerance liquids and vapors
ethylbenzene	Fierce polymerization can cause fire and explosion
ethylbenzene	Can form explosive mixtures at flashpoint or above
ethylbenzene	Containers may explode when heated
ethylbenzene	High resolution: easily ignited by heat, spark, flame
ethylbenzene	Leaks are at risk of fire/explosion
ethylbenzene	Risk of steam explosion indoors, outdoors, and in sewers
ethylbenzene	Steam can form an explosive mixture with air
ethylbenzene	Steam can move to the ignition source and flash back
ethylbenzene	Inhalation and skin absorption may be toxic
propylene glycol monomethyl ether acetic acid	Flammable liquids and vapors
propylene glycol monomethyl ether acetic acid	Fierce polymerization can cause fire and explosion
propylene glycol monomethyl ether acetic acid	Can form explosive mixtures at flashpoint or above
propylene glycol monomethyl ether acetic acid	Containers may explode when heated
propylene glycol monomethyl ether acetic acid	High resolution: easily ignited by heat, spark, flame
propylene glycol monomethyl ether acetic acid	Leaks are at risk of fire/explosion
propylene glycol monomethyl ether acetic acid	Risk of steam explosion indoors, outdoors, and in sewers
propylene glycol monomethyl ether acetic acid	Steam can form an explosive mixture with air
propylene glycol monomethyl ether acetic acid	Steam can move to the ignition source and flash back
propylene glycol monomethyl ether acetic acid	Steam can cause dizziness or suffocation without awareness
propylene glycol monomethyl ether acetic acid	Can produce irritating, corrosive and toxic gases in case of fire
propylene glycol monomethyl ether acetic acid	Inhalation and contact irritates or burns the skin and eyes
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	Containers may explode when heated
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	Some may burn, but will not ignite easily
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	Non-fungible and non-combustible materials themselves may not burn, but may decompose during heating to cause corrosive/toxic fumes
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	Can produce irritating, corrosive and toxic gases in case of fire
dibutyl dirorinate	Can decompose at high temperatures to produce toxic gases
dibutyl dirorinate	Containers may explode when heated
dibutyl dirorinate	Some may produce combustible hydrogen gas when in contact with metal
dibutyl dirorinate	Non-fungible and non-combustible materials themselves may not burn, but may decompose during heating to cause corrosive/toxic fumes
dibutyl dirorinate	Some may ignite combustible substances with oxidizing agents
dibutyl dirorinate	Toxicity: Inhalation, ingestion, and skin contact can cause serious injury and death
dibutyl dirorinate	Contact with molten material can cause serious burns to the skin and eyes
2-Ethylhexanoic acid zinc salt	Can decompose at high temperatures to produce toxic gases
2-Ethylhexanoic acid zinc salt	Containers may explode when heated
2-Ethylhexanoic acid zinc salt	Some may burn, but will not ignite easily
2-Ethylhexanoic acid zinc salt	Non-fungible and non-combustible materials themselves may not burn, but may decompose during heating to cause corrosive/toxic fumes
polyurethane	Stable at room temperature and atmospheric pressure conditions
polyurethane	Containers may explode when heated

polyurethane	Some may burn, but will not ignite easily
polyurethane	Can produce irritating, toxic gases in case of fire
polyurethane	Inhalation of substances may be harmful
polyurethane	Some liquids may cause dizziness and asphyxiation
B. Conditions to avoid	
carbon black	Friction, heat, spark, flame
carbon black	Ignition sources such as heat, spark, flame, etc
carbon black	Generating dust and debris such as perforation, shelves, and cutting
titanium dioxide	Ignition sources such as heat, spark, flame, etc
butyl acetate	Stay away from heat, spark, flame, high heat – no smoking
xylene	Stay away from heat, spark, flame, high heat – no smoking
ethylbenzene	Stay away from heat, spark, flame, high heat – no smoking
propylene glycol monomethyl ether acetic acid	Stay away from heat, spark, flame, high heat – no smoking
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	Ignition sources such as heat, spark, flame, etc
dibutyl dirorinate	Heat
2-Ethylhexanoic acid zinc salt	Ignition sources such as heat, spark, flame, etc
polyurethane	Ignition sources such as heat, spark, flame, etc
C. Substances to avoid	
carbon black	No data
titanium dioxide	combustible substances, reducing substances
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	combustible substances, reducing substances
dibutyl dirorinate	combustible substances, reducing substances
dibutyl dirorinate	Metal
2-Ethylhexanoic acid zinc salt	combustible substances, reducing substances
polyurethane	combustible material
polyurethane	irritable, toxic gas
D. Hazardous substances produced during decomposition	
carbon black	irritable, toxic gas
titanium dioxide	Corrosive/toxic fumes
titanium dioxide	irritable, corrosive, toxic gases
butyl acetate	irritable, corrosive, toxic gases
xylene	Irritating and highly toxic gases can be generated by pyrolysis or combustion during burning
ethylbenzene	Irritating and highly toxic gases can be generated by pyrolysis or combustion during burning
propylene glycol monomethyl ether acetic acid	irritable, corrosive, toxic gases
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	Irritating and highly toxic gases can be generated by pyrolysis or combustion during burning
Quaternary ammonium compounds, bis(hydrogenic resin alky	Corrosive/toxic fumes
dibutyl dirorinate	Corrosive/toxic fumes
dibutyl dirorinate	irritable, corrosive, toxic gases
2-Ethylhexanoic acid zinc salt	Irritating and highly toxic gases can be generated by pyrolysis or combustion during burning
2-Ethylhexanoic acid zinc salt	Corrosive/toxic fumes
2-Ethylhexanoic acid zinc salt	irritable, toxic gas
polyurethane	No data

1. information about toxicity

A. Information on the most likely exposure route

carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	"May cause irritation to respiratory organs
dibutyl dirorinate	May cause irritation by contacting the eyes"
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
B. Health hazard information	No data

acute toxicity	
an epigram	
carbon black	
titanium dioxide	LD50 > 8000 mg/kg Rat (no death, OECD Guideline 401)
butyl acetate	LD50 > 2000 ㎎/㎏ Mouse (OECD TG 420)
xylene	LD50 3200 ㎖/㎏ Rat (OECD TG 423)
ethylbenzene	LD50 3523 ㎎/㎏ Rat (EU Method B1)
propylene glycol monomethyl ether acetic acid	LD50 3500 ㎎/㎏ Rat
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	LD50 8532 ㎎/㎏ Rat
dibutyl dirorinate	LD50 > 5000 ㎎/㎏ Rat
dibutyl dirorinate	LD50 2071 ㎎/㎏ Rat
2-Ethylhexanoic acid zinc salt	No data
polyurethane	LD50 > 2000 mg/kg Rat (no death)
transdermal skin	No data
carbon black	
titanium dioxide	LD50 > 8000 ㎎/㎏ Rabbit
butyl acetate	No data
xylene	LD50 > 17600 ㎎/㎏ Rabbit (OECD TG 402)
ethylbenzene	LD50 1100 mg/kg (converted acute toxicity estimate (EU CLP harmonization classification: classification 4))
propylene glycol monomethyl ether acetic acid	LD50 > 20000 ㎎/㎏ Rabbit (OECD Guideline 402 GLP)
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	LD50 > 5000 ㎎/㎏ Rabbit
dibutyl dirorinate	No data
dibutyl dirorinate	LD50 > 2000 ㎎/㎏ Rat
2-Ethylhexanoic acid zinc salt	No data
polyurethane	LD50 > 2000 mg/kg Rat (no death similarities: 149-57-5 OECD TG 402, GLP)
Inhale	No data
carbon black	
titanium dioxide	Dust LC50>4.6 ㎎/㎥ 4 hr Rat (no dead animals to the highest concentration)
butyl acetate	Dust LC50> 6.82 mg/L Rat (OECD TG 403, no death)
xylene	Steam LC50 1802 mg/L Rat
ethylbenzene	Steam LC50 5922 ppm 4 hr Rat (25.713 mg/LEPA OPP 81-3, GLP; 1330-20-7; EU CLP harmonization classification: Classification 4)
propylene glycol monomethyl ether acetic acid	Steam LC50 4000 ppm 4 hr Rat (Rat LC50 4000 ppm 4 hr Conversion: 17.8 mg/L (ECHA, HSDB), RD50=1432 ppm 6.2 mg/L; EU CLP Harmonization Classification 4)
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	Steam LC0> 2000 ppm 3 hr Rat (no death observed at corresponding concentrations)

dibutyl dirorinate	분진 LC50> 12.6 ㎎/ℓ 4 hr Rat (GLP data)
dibutyl dirorinate	Gas LD50 > 2000 mg/kg Rat
2-Ethylhexanoic acid zinc salt	No data
polyurethane	Dust LC50> 5.7 mg/L 4 hr Rat (No death similarities: 1314-13-2 OECD TG 403)
Corrosive or irritable to the skin	No data
carbon black	
titanium dioxide	No irritation occurred as a result of the skin corrosiveness/irritation test using rabbits (OECD Guideline 404)
butyl acetate	Skin corrosiveness/irritation test using rabbits showed no irritation, erythema index=0, OECD TG 404
xylene	Skin corrosiveness/irritation test results in rabbits show no irritation OECD TG 404
ethylbenzene	Skin irritation test using rabbits EU Method B.4 Results Intermediate irritation with primary skin irritation index 3
propylene glycol monomethyl ether acetic acid	Skin irritation test using rabbits shows moderate irritation
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Rabbit: Not irritating
dibutyl dirorinate	no irritation to the skin
2-Ethylhexanoic acid zinc salt	Corrosive, rat, OECD TG 402
polyurethane	Skin corrosiveness/irritation test using Rabbit shows irritation OECD TG 404, GLP-like substance CAS No. 85203-81-2
Severe eye damage or irritation	No data
carbon black	
titanium dioxide	Severe eye damage/irritation test using rabbits showed no minor irritation (OECD Guideline 405)
butyl acetate	Severe eye damage/stimulus test using rabbits showed no irritation. Conjunctival redness index = 1-2, OECD TG 405, GLP
xylene	Severe eye damage/stimulus tests in rabbits showed corneal index: 0.33/4, iris index: 0.56/2, conjunctival index 1/3, conjunctival edema index: 0.33/4 OECD TG 405, GLP
ethylbenzene	"Eye and respiratory irritation effects appear in the human body exposed to mixed xylene of 100 ppm STEL based on short-term exposure."
propylene glycol monomethyl ether acetic acid	vessels not easily identified) was observed upon o-xylene infusion into rabbits. Conjunctival chemoembolism (above normal swelling) and conjunctival secretions (above normal amount) were observed in five rabbits at 1 hour after
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Regulations on Classification and Labeling of Chemical Substances by the Ministry of Environment: Classification 2"
dibutyl dirorinate	In rabbits, eye irritation test showed no minor irritation or corneal damage to the conjunctiva
2-Ethylhexanoic acid zinc salt	Rabbit: Mild irritation
polyurethane	Moderate eye irritation observed in animal experiments
respiratory hypersensitivity	High irritability, Rabbit, fully reversible within 21 days, OECD TG 405
carbon black	Severe eye damage/stimulus test using Rabbit showed irritation (OECD TG 405, GLP) (similar substance CAS No. 85203-81-2)
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
skin sensitivity	
carbon black	Skin sensitivity test using guinea pigs showed no skin sensitivity (OECD Guideline 406, GLP)

titanium dioxide	Skin sensitivity test using guinea pigs shows that it does not cause skin sensitivity, OECD TG 403
butyl acetate	Buehler test results using guinea pigs show non-sensitive OECD TG 406
xylene	Mice Local Lymph node Trial OECD TG 429 Unsensitive
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	Guinea pig/maximization test (GLP): No hypersensitivity
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Does not cause skin irritation
dibutyl dirorinate	Hypersensitivity, Guinea pig, GLP, female/male, guinea pig maximization test (GMPT): dose level: 0.2 g paste at 10% test sustain conc., reaction: 20/20, OECD TG 406
2-Ethylhexanoic acid zinc salt	Skin sensitivity test using guinea pigs shows no hypersensitivity OECD TG 406, GLP-like substance CAS No. 1314-13-2
polyurethane	No data
carcinogenicity	
Occupational Safety and Health Act	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
Ministry of Employment and Labor Examination	
carbon black	2
titanium dioxide	2
butyl acetate	No data
xylene	No data
ethylbenzene	2
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
IARC	
carbon black	2B
titanium dioxide	2B
butyl acetate	No data
xylene	3
ethylbenzene	2B
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	3
OSHA	
carbon black	Applicable
titanium dioxide	No data

butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
ACGIH	
carbon black	A3
titanium dioxide	A4
butyl acetate	No data
xylene	A4
ethylbenzene	A3
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
NTP	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
EU CLP	
carbon black	No data
titanium dioxide	2 (limited to powder forms containing 1% or more of particles with an aerodynamic diameter of 10 μm or less)
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
germ cell mutagenicity	
carbon black	"The test results of sister chromatin exchange analysis using mammals in vitro were negative (OECD Guideline 479) regardless of the presence or absence of a metabolic system."
titanium dioxide	Gene mutation test using mammals in vitro negative with or without a metabolic system (OECD Guideline 476)
butyl acetate	Returning mutant test results using microorganisms in vitro are negative (OECD Guideline 471, GLP) regardless of the presence or absence of a metabolic system

xylene	The results of the sex link febrile death test using in vivo fruit flies are negative (OECD Guideline 477) "
ethylbenzene	Return mutation test using microorganisms in vitro OECD TG 471, mammalian cell gene mutation test OECD TG 476, and chromosome abnormality test OECD TG 473 results negative, in vivo chromosome abnormality test, and fade test results negative regardless of metabolic activity
propylene glycol monomethyl ether acetic acid	"As a result of the bacterial return mutation test using microorganisms in vitro, negative OECD Guideline 471 with or without a metabolism system."
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	In vivo mammalian erythrocyte micronucleus test results negative OECD Guideline 474"
dibutyl dirorinate	Returning mutation test using in vitro bacteria OECD TG471 results negative, micronuclear test using in vivo mouse bone marrow cells OEF 474, GLP results negative
2-Ethylhexanoic acid zinc salt	"Genotoxicity test using mouse lymphoma L5178Y cell negative, Chinesse hamster Ovary; Chromosomal aberration test using CHO cells negative, OECD TG476, GLP, OECD TG473
polyurethane	Micronuclear test results using mouse bone marrow cells, Unscheduled DNA synthesis using mammalian hepatocytes; UDS test results negative, OECD TG474, OECD TG486, GLP"
reproductive toxicity	
carbon black	No reproductive toxicity occurred as a result of the test of the early-stage formation/mother toxicity/developmental toxicity using rats (OECD Guideline 414)
titanium dioxide	As a result of the reproductive development toxicity test using rats, no effects such as clinical symptoms and weight change were observed. NOAEL= 1000 mg/kg bw/day (OECD TG 210)
butyl acetate	"The second-generation reproductive toxicity test in rats showed a decrease in body weight, weight gain, and food intake at 1500 ppm to 2000 ppm (NOAEL systemic toxicity, adult rats=750 ppm (nominal)) (OECD TG 416, GLP)
xylene	As a result of fetal developmental toxicity tests in rats, weight and liver weight loss, baby size reduction, and rib deformities were observed, but maternal toxicity was judged to be greater than developmental toxicity (NOAELMATERAL TOXICITY=2.5 mg/L air (nominal), NOAEL TERATOGENICITY=10 mg/L (nominal)) (GLP, OECD Guideline 414) "
ethylbenzene	No toxic effects related to reproduction and development were observed up to the tested highest concentration (500 ppm) as a result of the second-generation rat reproductive toxicity (repetitive inhalation exposure, EPA OPPTS 870.3800). NOAEC (progenital/developmental/parent toxicity)>=500 ppm rat developmental inhalation toxicity test (OECD TG414) found that BMCL10 (development)=5761 mg/㎥ due to weight loss of newborns and BMCL10 (mother toxicity)=2675 mg/㎥ due to weight loss of the mother
	"No adverse effects related to reproduction or development were observed up to 500 ppm as a result of the second-generation inhaled reproductive toxicity test (OECD TG416, GLP) using rats. NOEL for parental systemic toxicity is NOEL=100 ppm due to weight loss or liver weight gain. As a result of the inhalation and developmental toxicity test (EOCD TG414, GLP) using rats, no malformation effect was observed up to 2000 ppm. Maternal toxicity is shown to be weak at 1000 or 2000 ppm. Maternal toxicity is shown to be reduced in body weight and feed consumption at 1000 and 2000 ppm. NOAEL=2000ppm, NOAEL=500ppm."
propylene glycol monomethyl ether acetic acid	"Rat/ oral (0, 100, 300, 1000 mg/kg/day for 44D (M) and 41-45D (F))" (GLP): no toxic effects on reproductive variables
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Rat/Inhalation (500, 2000, 4000 ppm for 21D) (GLP): No malformation or other generative toxic effects."
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	"Medium dose NOAEL= 30 mg/kg diet (1.9-2.3 mg/kg body weight/day), low dose NOAEL= 5 mg/kg diet (1.9-2.3 mg/kg body weight/day), OECD TG 421, GLP
polyurethane	In oral (observation) atlithiasis studies in rats, the test substance was determined to have NOAEL of 1.0 mg/kg bw/day for maternal toxicity and 5.0 mg/kg bw/day for atlithiasis, rat, OECD TG 414, GLP"

Specific target organ toxicity (1 exposure)	"The results of the second generation oral reproductive toxicity test using rats showed significant effects on fertility and viability in parents. NOAEL = 7.5 mg/kg bw/day (F1) (OECD TG 416) (similar substance zinc chloride)
carbon black	Developmental toxicity/phase formation test using rats showed phase formation at doses not containing maternal toxicity. The main target is skeletal NOAEL = 300 mg/kg bw/day (parent toxicity), 100 mg/kg bw/day (phase formation) "
titanium dioxide	No data
butyl acetate	
xylene	No data
ethylbenzene	Acute oral toxicity test using rats showed no death, weight change and no significant lesions observed during autopsy OECD TG 425
propylene glycol monomethyl ether acetic acid	
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	
dibutyl dirorinate	Causing central nervous system disorders, pulmonary edema, and respiratory irritation in humans. Target organs: central nervous system, respiratory system
2-Ethylhexanoic acid zinc salt	Dizziness is reported in humans, and remarkable arousal, progression, and anesthesia are reported in experimental animals. Exposure to 100 ppm442 mg/㎥ in humans causes weak irritation to the eyes and upper airways and slight effects on the central nervous system
polyurethane	To cause nervous system effects and airway stimulation, such as dizziness, in experimental animals.
Specific target organ toxicity (repeated exposure)	
carbon black	Repeated exposure of the human body for more than 10 years results in reduced airway resistance and expiratory flow, cough, phlegm, chronic bronchitis, pulmonary dysfunction, pneumoconiosis, emphysema, pulmonary perfusion disorder, obstructive gout, etc., not applied to the classification in this item due to carcinogenic effects
titanium dioxide	NITE classification 2
butyl acetate	"<Pseudo-material CAS No. 71-36-3> After 90 days of repeated administration of rodents in rats, abnormalities in the central nervous system such as ataxia and decreased activity were observed after 2~3 minutes of exposure in the 600mg/kg concentration group." No other special effects were observed NOAEL= level: 125 mg/kg bw/day normal EPA OTS 798.2650, GLP
xylene	Results of the 90-day inhalation toxicity trial in rats show acute and short-term symptoms of decreased activity level at moderate and highest concentrations, reduced body weight and feeding intake, and upper respiratory irritation of the nasal cavity NOAEC=500 ppm GLP, EPA OTS 798.2450"
ethylbenzene	Central nerve disorders (poor appetite, vomiting, nightmares, forgetfulness, anxiety, dizziness after posture change, etc.) are observed and reported in humans and animals. Chronic exposure to substances is reported to cause hearing loss due to noise. Toxic substance classification examination by the National Institute of Environmental Research: Classification 1
propylene glycol monomethyl ether acetic acid	"Based on the 13-week repeated oral toxicity test using rats, the results of the NOAEL=75 mg/kg bw/day OECD TG408, GLP, ECHA, based on hematologic changes showing weak regenerative anemia, increased liver weight, and changes in central lobular hepatocellular hypertrophy."
Quaternary ammonium compounds, bis(hydrogenic re:	As a result of the 13-week inhaled repeat toxicity test using mice, liver and kidney weight increased above 750 ppm3.55 mg/L, but no other histopathologic findings or adverse effects were observed NOAEC=1000 ppm4.74 mg/LOECD TG413, ECHA
dibutyl dirorinate	Inhalation neurotoxicity using rats To confirm OECD TG424, inhalation and repeated exposure at a concentration of 200-800ppm for 4 weeks-13 weeks and 200-800ppm did not recover hearing thresholds even 8 weeks after stopping exposure at a concentration of 400ppm or more. 8-week recovery period OHC loss of 200-800ppm increased severely to 4% and 100%, respectively. LOAEL=200ppm"
2-Ethylhexanoic acid zinc salt	"Rat/Gu (0, 100, 300, 1000 mg/kg/day for 44D(M) and 41-55D(F)) (GLP): No toxic effects observed.
polyurethane	Rat (male, female) / inhalation (300, 1000, 3000 ppm for 2W) (GLP): Some olfactory epithelial damage is seen, no other symptoms observed."
aspiration hazard	Repeated exposure study results NOAEL (12-weekrat) = approx. 12,500-25,000 mg/kg-bw/day

carbon black	Oral (Achronic): NOEL=40 ppm of di-n-butyltin dichloride in the diet for 90 days in rats, only very small changes at twice this level, if a typical 100-fold safety factor is allowed, a person can safely consume it at a dose of 0.02 mg/kg/day and 1.2 mg/kg/day for 60 kg adults, Rat, OECD TG 408
titanium dioxide	As a result of the 90-day repeated oral toxicity test using mice, growth was delayed, but no significant effect was observed. NOEL = 3000 ppm OECD TG 408 Similar substance CAS No. 7733-02-0
butyl acetate	No data
xylene	
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	동점도: 0.86 mm2/s @ 20degC (expolated calculation)
2-Ethylhexanoic acid zinc salt	Hydrocarbons. Swallowing liquids can cause chemical pneumonia due to osmosis. Dynamicity factor 0.64 ㎟/s 25 °C
polyurethane	No data
Other adverse effects	No data
carbon black	Viscosity 72 mPas (dynamic) 20°C molecular structure C32H64O4Sn, viscosity 72 mPas (dynamic) 20°C molecular structure C32H64O4Sn
titanium dioxide	No data
butyl acetate	No data
xylene	
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data

12. environmental impact

A. Ecotoxicity

fish

carbon black	LC50 > 1000 ㎎/ℓ 96 hr 기타 (Tribolodon hakonensis)
titanium dioxide	LC50 > 100 ㎎/ℓ 96 hr Carassius auratus (OECD Guideline 203)
butyl acetate	LC50 18 ㎎/ℓ 96 hr Pimephales promelas (유수식, OECD Guideline 203)
xylene	LC50 2.6 ㎎/ℓ 96 hr (OECD Guideline 203)
ethylbenzene	LC50 5.1 ㎎/ℓ 96 hr
propylene glycol monomethyl ether acetic acid	LC50 ≥ 100 ㎎/ℓ 96 hr Oryzias latipes
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	LC50 262.89 ㎎/ℓ Lepomis cyanellus
dibutyl dirorinate	(Danio rerio, OECD Guideline 203)
2-Ethylhexanoic acid zinc salt	LC50 100 ㎎/ℓ 96 hr Cyprinus carpio (유사물질 CAS No. 85203-81-2, OECD Guideline 203, GLP)
polyurethane	No data

crustaceans

carbon black	EC50 > 5600 ㎎/ℓ 24 hr Daphnia magna (OECD Guideline 202, GLP)
titanium dioxide	LC50 > 500 ㎎/ℓ 48 hr Daphnia magna
butyl acetate	EC50 44 ㎎/ℓ 48 hr Daphnia magna
xylene	LC50 3.6 ㎎/ℓ 24 hr (OECD TG202)
ethylbenzene	LC50 1.8 ㎎/ℓ 48 hr Daphnia magna (Ceriodaphnia dubia NOEC 1.0 ㎎/L (0.96 ㎎/L) 7days)

propylene glycol monomethyl ether acetic acid	EC50 373 ㎎/ℓ 48 hr Daphnia magna
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	No data
dibutyl dirorinate	EC50 1.7 ~ 3.4 ㎎/ℓ 48 hr Daphnia magna
dibutyl dirorinate	(OECD TG 202, EC guideline 92/69/EEC (2), exponential, freshwater)
2-Ethylhexanoic acid zinc salt	EC50 0.131 ~ 1.06 ㎎/ℓ 48 hr Daphnia magna (유사물질: 7733-02-0 OECD TG 202, GLP)
polyurethane	No data
bird	
carbon black	ErC50 > 10000 ㎎/ℓ 72 hr 기타 (Desmodesmus subspicatus, OECD Guideline 201, GLP)
titanium dioxide	EC50 > 50 ㎎/ℓ 72 hr Selenastrum capricornutum
butyl acetate	EC50 335 ㎎/ℓ 72 hr Selenastrum capricornutum
xylene	EC50 1.3 ㎎/ℓ 48 hr (OECD TG201, GLP)
ethylbenzene	EC50 2.6 ㎎/ℓ 96 hr 기타 (marine invertebrate)
propylene glycol monomethyl ether acetic acid	EC50 ≥ 1000 ㎎/ℓ 72 hr Selenastrum capricornutum
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	No data
dibutyl dirorinate	EC50 > 1 ㎎/ℓ 72 hr Desmodesmus subspicatus
dibutyl dirorinate	(OECD TG 201, EU Method C.3 (Algal Inhibition test), 지수식, 담수)
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
B. Residual and degradable	
Residuity	
carbon black	No data
titanium dioxide	No data
butyl acetate	log Kow 1.78
xylene	log Kow 3.15
ethylbenzene	log Kow 3.15
propylene glycol monomethyl ether acetic acid	log Kow 0.43
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	No data
dibutyl dirorinate	01 4.44 log Kow
dibutyl dirorinate	(log Pow, 20.8℃)
2-Ethylhexanoic acid zinc salt	log Kow > 5.7 (OECD TG 107)
polyurethane	No data
Degradability	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM…	No data
dibutyl dirorinate	78% within 14 days of BOD5/COD culture
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
C. Bioenrichment	
concentration	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data

xylene	BCF 25.9 (Oncorhynchus mykiss)
ethylbenzene	BCF 1 (BCF)
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	05 1.49 log BCF
dibutyl dirorinate	(Non-dimensional number)
2-Ethylhexanoic acid zinc salt	BCF 38 ~ 28960
polyurethane	No data
biodegradable	
carbon black	No data
titanium dioxide	No data
butyl acetate	83 % 28 day (OECD TG 301D)
xylene	90% 28 day (Dissoluble, OECD TG301F, GLP)
ethylbenzene	70 ~ 80 % 28 day (ISO 14593 CO2 headspace시험, GLP)
propylene glycol monomethyl ether acetic acid	> 60 (%) 28 day
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	23 01 39 day
dibutyl dirorinate	(O2 consumption)
2-Ethylhexanoic acid zinc salt	60 % 28 day (OECD TG 301D, GLP)
polyurethane	No data
D. Soil mobility	
carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	No data
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data
E. Other adverse effects	
carbon black	조류:Desmodesmus subspicatus: NOEC, 72h, > 10000 mg/L, OECD Guideline 201, GLP
titanium dioxide	No data
butyl acetate	No data
xylene	"Chronic Toxicity Test for Fish NOEC56d>1.3 mg/L
ethylbenzene	조류 Selenastrum capricornutum, NOEC96h=3.4 mg/L 지수식 EPA 1985, GLP
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	"Crustacea Daphnia magna: NOEC21d = 0.048 to 0.156 mg/L semi-collective OECD TG 211 similar substance CAS No. 7646-85-7
polyurethane	No data

13. Precautions for disposal

A. Disposal method	
carbon black	No data
titanium dioxide	No data

butyl acetate	(1) Treat it as neutralization, hydrolysis, oxidation, and reduction.
xylene	2) Heat incineration or melt at high temperature.
ethylbenzene	3) Take care of solidification."
propylene glycol monomethyl ether acetic acid	"Take care of it in one of the following ways.
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	1. Incineration.
dibutyl dirorinate	2. After treatment by evaporative or concentrated methods, incinerate the residue.
2-Ethylhexanoic acid zinc salt	3. After purifying by separation, distillation, extraction, and filtration, incinerate the residue.
polyurethane	4. Treat with neutralization, oxidation, reduction, polymerization, and condensation reactions.
B. Precautions for disposal	5. Incineration of residues, or disposal again by means of agglutination, precipitation, filtration, and dehydration, and incineration of residues."
carbon black	"Take care of it in one of the following ways.
titanium dioxide	1. Treat with neutralization, oxidation, and reduction reactions, and then treat with agglutination, precipitation, filtration, and dehydration.
butyl acetate	2. Dispose by evaporation or concentration.
xylene	3. Purify by means of separation, distillation, extraction, and filtration."
ethylbenzene	1) If oil and water can be separated, pre-treat it with oil and water separation method. Dispose of contents and containers in accordance with the regulations if specified in the Waste Management Act.
propylene glycol monomethyl ether acetic acid	
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Dispose of contents and containers in accordance with the regulations if specified in the Waste Management Act.
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	(1) Incineration.
polyurethane	2) If incineration is difficult, crush, cut or melt the designated waste to a maximum diameter of 15 centimeters or less and bury it in a managed landfill facility where it can be buried."

14. information needed for transportation

A. United Nations (UN No.)	1263
B. Appropriate shipping name	" " Paint including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler, and liquid lacquer base "
C. Risk class in transportation	
D. Courage level	3
E. Marine pollutants	III
F. Special safety measures that users need to know or need to know about transportation or means of transportation	Not applicable
In accordance with the Safety Management Act for Dangerous Goods in Local Transportation	
Packaging and transportation in accordance with DOT and other regulations	
Types of emergency measures in case of fire	
Types of emergency measures in case of spillage	F-E(Non-water-reactive flammable liquids)

15. Status of legal regulations

A. Regulations under the Occupational Safety and Health Act	
carbon black	Exposure standard setting substance

titanium dioxide	Hazardous substances subject to management
titanium dioxide	Material subject to work environment measurement (measurement cycle: 6 months)
titanium dioxide	Exposure standard setting substance
butyl acetate	Materials subject to submission of Process Safety Report (PSM)
butyl acetate	Hazardous substances subject to management
butyl acetate	Material subject to work environment measurement (measurement cycle: 6 months)
butyl acetate	Exposure standard setting substance
xylene	Materials subject to submission of Process Safety Report (PSM)
xylene	Hazardous substances subject to management
xylene	Material subject to work environment measurement (measurement cycle: 6 months)
xylene	Subject to special health examination (diagnosis cycle: 12 months)
xylene	Exposure standard setting substance
ethylbenzene	Materials subject to submission of Process Safety Report (PSM)
ethylbenzene	Hazardous substances subject to management
ethylbenzene	Material subject to work environment measurement (measurement cycle: 6 months)
ethylbenzene	Subject to special health examination (diagnosis cycle: 12 months)
ethylbenzene	Exposure standard setting substance
propylene glycol monomethyl ether acetic acid	Materials subject to submission of Process Safety Report (PSM)
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	Hazardous substances subject to management
dibutyl dirorinate	Material subject to work environment measurement (measurement cycle: material subject to work environment measurement for 6 months)
dibutyl dirorinate	Special health examination target substance (diagnosis cycle: special health examination target substance 12 months)
dibutyl dirorinate	Exposure standard setting substance
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data

B. Regulations under the Chemical Substances Control Act

carbon black	No data
titanium dioxide	No data
butyl acetate	No data
xylene	Toxic substances
ethylbenzene	No data
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data

C. Regulations under the Dangerous Goods Safety Management Act

carbon black	No data
titanium dioxide	No data
butyl acetate	Class 4 2 Oil (non-water-soluble) 1000 L
xylene	Class 4 2 Oil (non-water-soluble) 1000 L
ethylbenzene	Class 4 First Oil (non-water-soluble) 200 L
propylene glycol monomethyl ether acetic acid	Class 4 2 Petroleum (non-aqueous liquid) 1000ℓ
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	4th class: 6000ℓ of 4th oil
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data

D. Regulations under the Waste Management Act

carbon black	No data
titanium dioxide	No data
butyl acetate	designated waste
xylene	designated waste
ethylbenzene	designated waste
propylene glycol monomethyl ether acetic acid	No data
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	No data
dibutyl dirorinate	No data
2-Ethylhexanoic acid zinc salt	No data
polyurethane	No data

E. Regulations under other domestic and foreign laws

domestic regulation

carbon black	
titanium dioxide	
butyl acetate	
xylene	
ethylbenzene	
propylene glycol monomethyl ether acetic acid	
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	
dibutyl dirorinate	
2-Ethylhexanoic acid zinc salt	
polyurethane	

Other domestic regulations

carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable

foreign regulations

US Management Information (OSHA Regulations)

carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable

US Management Information (CERCLA Regulations)

carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	2267.995kg 5000lb

xylene	45.3599kg 100lb
ethylbenzene	453.599kg 1000lb
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US Management Information (EPCRA 302)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US Management Information (EPCRA 304)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US Management Information (EPCRA 313)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Applicable
ethylbenzene	Applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US Management Information (Rotterdam Convention Material)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable

Quaternary ammonium compounds, bis(hydrogenic re	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US Management Information (Stockholm Convention Material)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
US management information (Montreal's emotional material)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	Not applicable
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
EU classification information (final classification result)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Flam. Liq. 3 STOT SE 3
xylene	Flam. Liq. 3 Acute Tox. 4 * Acute Tox. 4 * Skin Irrit. 2
ethylbenzene	Flam. Liq. 2 Acute Tox. 4 * Asp. Tox. 1 STOT RE 2
propylene glycol monomethyl ether acetic acid	R10Xi; R36
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Muta. 2, Repr. 1B, STOT RE 1
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
EU classification information (danger phrase)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	H226 H336

xylene	H226 H332 H312 H315
ethylbenzene	H225 H332 H304 H373 (hearing organs)
propylene glycol monomethyl ether acetic acid	R10, R36
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	H341, H360FD, H372 (immune system)
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable
EU classification information (safety phrase)	
carbon black	Not applicable
titanium dioxide	Not applicable
butyl acetate	Not applicable
xylene	Not applicable
ethylbenzene	Not applicable
propylene glycol monomethyl ether acetic acid	S2, S25
Quaternary ammonium compounds, bis(hydrogenic resin alkyl) dimethyl, salts with bentonites (QUATERNARY AMMONIUM...	Not applicable
dibutyl dirorinate	Not applicable
2-Ethylhexanoic acid zinc salt	Not applicable
polyurethane	Not applicable

16. Other references

A. Source of data

- According to Article 110 of the Occupational Safety and Health Act and No. 2023-9 of the Ministry of Employment and Labor (Criteria for Classification of Chemical Substances* Marking and Material Safety and Health Data), this MSDS provides

Based on this, it is prepared in consideration of the current status of domestic regulatory laws and regulations.

B. Date of initial creation	2020-07-05
C. Number of revisions and final revision date	
Number of revisions	1회
Last revision date	2024-03-25
D. Other	

" ○ The prepared material safety data (MSDS) was edited and partially modified by referring to the MSDS provided by the Korea Occupational Safety and Health Agency
It's data."