물질안전보건자료
(Material Safety Data Sheet)

Name of the product	KUT570(A)-WHITE

1. Information about chemicals and companies

A. Product name	KUT570(A)-WHITE
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. Harmful and dangerous

A. Classification of hazards and risks	Flammable liquid: classification2
	Flammable solid: classification2
	Natural ignition solid: classification1
	Acute toxicity (percutaneous) : classification4
	Skin Corrosive/Skin Irritability: Classification
	Severe eye damage/eye irritation: classification1
	Carcinogenicity: Classification 1A
	Specific target organ toxicity (1 exposure): Classification 3 (breathing machine stimulation)
	Specific target organ toxicity (1 exposure): Classification 3 (anesthesia)
	Aspiration hazard: classification1
B. Warning sign items including precautionary statements	
Picture Text	
Signal word	Danger
Hazardous and hazardous statements	H225 Highly flammable liquids and vapors
	H228 Flammable Solid
	H250 self-igniting when exposed to air
	H304 May be fatal if swallowed and introduced into the airway
	H312 Harmful in contact with skin
	H315 Causes skin irritation
	H318 Causes severe eye damage
	H335 May cause respiratory irritation
	H336 May cause drowsiness or dizziness
	May cause H350 cancer
Precautionary statement	
Prevention	P201 Obtain the handling manual before use.
	P202 Do not handle all safety precautions until you have read and understood th
	P210 Stay away from heat, spark, flame and high heat - No smoking
	P222 Do not contact air.
	P233 Seal the container tightly.
	Connect or ground the P240 container and shelter.
	P241 Use electrical, ventilation, lighting, (...) and equipment to prevent explosior
	Use only tools that do not cause P242 sparks.
	P243 Take anti-static measures.
Prevention	P261 Avoid inhalation of dust, fume, gas, mist, steam, spray.
	P264 Wash the handling area thoroughly after handling.

	P271 Handle only outdoors or in well ventilated areas.
	P280 Wear protective gloves, protective clothing, eye protection, and face protec
	P301+P310 If swallowed, seek medical attention immediately.
	P302+P352 Wash with plenty of water/... if it gets on your skin.
	P303+P361+P353 Take off all contaminated clothing if it is on the skin (or hair). Wash/Shower your skin with water.
	P304+P340 When inhaled, move to a place with fresh air and stabilize in a breathable position.
	P305+P351+P338 If it gets on your eyes, wash it carefully with water for a few minutes. Remove contact lenses if possible. Keep washing.
Response	P308+P313 If exposed or feared exposed, seek medical attention.
	P310 Seek immediate medical attention.
	P312 If you feel uncomfortable, consult a medical institution.
	P321 (…) Treat.
	P331 Don't make me throw up.
	P332+P313 If skin irritation occurs, seek medical measures and advice.
	P335+P334 Remove any substances from the skin, soak in cold water, or wrap them with a wet bandage.
	P362+P364 Take off contaminated clothing and clean it before using again.
	P370+P378 To extinguish fire in case of fire (…)Use .
	Store the P403+P233 container tightly sealed in a well ventilated area.
Storage	P403+P235 Store in a well-ventilated place and keep it low.
	P405 Store in a storage area with a lock.
	P422 Fill and store the appropriate (...)
Disposal	P501 Dispose of the container (as specified in the relevant laws and regulations)
Silicon oxide (crystalline quartz)	
Health	No data
Fire	No data
Reactive	No data
titanium dioxide	
Health	0
Fire	No data
Reactive	0
Xylene	
Health	1
Fire	3
Reactive	0
Ethylbenzene	
Health	1
Fire	3
Reactive	0
Isobutyl alcohol	
Health	3
Fire	2
Reactive	0
Propylene glycol monomethyl ether acetic acid	
Health	1
Fire	2
Reactive	0
N-methylmorpholine	
Health	3
Fire	3
Reactive	0
Propylene glycol	
Health	0
Fire	1

3. Name and content of components

Material name	Nomenclature (tolerance)	CAS number	content (%)
Silicon oxide (crystalline quartz)		14808-60-7	0.1 ~ 0.9
titanium dioxide		13463-67-7	21 ~ 30
Xylene	Xylene, o,m,p-isomers	1330-20-7	11 ~ 20
	Xylene(o,m,p-isomers)		
Ethylbenzene	Ethyl benzene	100-41-4	0.1 ~ 0.9
Isobutyl alcohol	Isobutyl alcohol	78-83-1	0.1 ~ 0.9
Propylene glycol monomethyl ether acetic acid	1-methoxy-2-propanol acetic acid (1-METHOXY-2-PROPANOL ACETATE);	108-65-6	1 ~ 10
N-methylmorpholine	4-methylmorpholine (4-METHYLMORPHOLINE);	109-02-4	0.1 ~ 0.9
Propylene glycol	1,2-propanediol (1,2-PROPANEDIOL);	57-55-6	0.1 ~ 0.9
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	organic clay (ORGANOPHILIC CLAY);	68953-58-2	0.1 ~ 0.9
Zirconium		7440-67-7	0.1 ~ 0.9
ACRYLIC RESIN	NO DATA	NO DATA	41 ~ 50

4. First aid measures

A. When you get in the eye,

If it gets on your eyes, wash it carefully with water for a few minutes. Remove contact lenses if possible. Keep washing.

Get emergency medical attention.

B. When you come into contact with your skin,

Take off all contaminated clothing if it is on your skin (or hair). Wash/Shower your skin with water.

If skin irritation occurs, seek medical measures and advice.

Get emergency medical attention.

Remove contaminated clothing and shoes and isolate contaminated areas.

Prevent the spread of contaminated areas in case of minor skin contact.

In case of burns, cool the affected area immediately with cold water for as long as possible, and do not remove clothes that stick to the skin.

Wash your skin with soap and water.

Get medical assistance when the melt is stuck on the skin and removed.

C. When you inhale it.

Seek medical attention immediately.

Don't make me throw up.

C. When you inhale it.

Remove excess dust or fume with clean air and take medical measures if you have cough or other symptoms.

D. When you eat.

If swallowed, seek medical attention immediately.

Don't make me throw up.

When eating or inhaling substances, do not use mouth-to-mouth respiration techniques and use appropriate breathing apparatus.

E. Other medical precautions

Contact the medical staff and take special emergency measures such as follow-up investigation when exposing.

Let medical personnel be aware of the substance and take protective measures.

5. How to deal with explosions and fires

A. Adequate (inappropriate) digestive medicine

Adequate (inappropriate) digestive medicine

Use alcohol foam, carbon dioxide or water spray when extinguishing this substance.
Use dry sand or soil for asphyxiation

B. Specific hazards arising from chemicals

Specific hazards arising from chemicals

Highly flammable liquids and vapors

Flammable solids

When exposed to air, it ignites itself.

Unstable at room temperature

Can cause fire and explosion due to intense polymerization

Steam can be transferred to the ignition source and ignited

May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Explosive mixture may be formed at or above the ignition point

Containers may explode when heated

	Highly flammable: easily ignited by heat, sparks and flames
	Leaks are at risk of fire/explosion
	Can ignite by friction, heat, spark, flame
	Explodes or explosively burns with powder, dust, debris, drilling, shelves, cutting, etc.
	Can be re-ignited after fire extinguishing
	Can ignite when in contact with moisture
	Risk of vapor explosion in indoor, outdoor, and sewer systems
	flammable/combustible materials
	Some substances flash and can burn quickly
	Some may burn but do not ignite easily
	Steam can form explosive mixtures with air
	Some may be exploded upon fire or heating
	Non-inflammatory, the substance itself does not burn, but may decompose during heating, resulting in corrosive/toxic fume

C. Protective equipment and preventive measures to be worn in the event of a fire.

Silicon oxide (crystalline quartz)	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	It may be molten and transported, so be careful.
	Dig a ditch to dispose of the fire hydrant, lock it up, and keep the matter from scattering.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
titanium dioxide	It may be molten and transported, so be careful.
	Dig a ditch to dispose of the fire hydrant, lock it up, and keep the matter from scattering.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Xylene	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	Most of them are lighter than water, so be careful.
	Most vapors are heavier than air, so they can spread along the ground and accumulate in lowlands or confined spaces
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Ethylbenzene	Rescuers should wear appropriate protective gear.

	Keep a safe distance away from the area and digest it.
	Most of them are lighter than water, so be careful.
	Most vapors are heavier than air, so they can spread along the ground and accumulate in lowlands or confined spaces
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Isobutyl alcohol	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
Propylene glycol monomethyl ether acetic acid	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	Most of them are lighter than water, so be careful.
	Most vapors are heavier than air, so they can spread along the ground and accumulate in lowlands or confined spaces
	If it's not dangerous, move the containers from the fire area.
	Do not directly water the exposed source or safety device as it may freeze in the event of a tank fire.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
N-methylmorpholine	Most vapors are heavier than air, so they can spread along the ground and accumulate in lowlands or confined spaces
	Dig a ditch to dispose of the fire hydrant, lock it up, and keep the matter from scattering.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	Do not allow water to enter the container.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Propylene glycol	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	It may be molten and transported, so be careful.
	Dig a ditch to dispose of the fire hydrant, lock it up, and keep the matter from scattering.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.

	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	It may be molten and transported, so be careful.
	Dig a ditch to dispose of the fire hydrant, lock it up, and keep the matter from scattering.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.
	In the event of a tank fire, use unmanned fire extinguishing equipment for large-scale fires, and if it's impossible, let it burn.
Zirconium	Rescuers should wear appropriate protective gear.
	Keep a safe distance away from the area and digest it.
	If it's not dangerous, move the containers from the fire area.
	In the event of a tank fire, fire it at maximum distance or use unmanned fire extinguishing equipment.
	Do not allow water to enter the container.
	In the event of a tank fire, cool the container with plenty of water even after extinguishing the fire.
	In case of a tank fire, withdraw immediately if there is a high-pitched sound or if the tank discolors.
	In the event of a tank fire, get out of the tank in flames.

6. How to deal with leakage accidents

A. Actions and protective gear required to protect the human body	Avoid inhalation of dust, fume, gas, mist, steam, spray.
A. Actions and protective gear required to protect the human body	Stop the leak if it's not dangerous.
	Do not touch damaged containers or leaks without proper protective clothing.
	Steam suppression foam may be used to reduce steam generation
	Wear full protective steam protective clothing in case of fire-free leakage.
	Cover it with plastic sheets to stop the spread.
B. Necessary measures to protect the environment	Pay attention to substances and conditions to avoid Prevent the inflow of waterways, sewers, basements, and confined spaces in case of large leaks.
C. Purification or removal method	Prevent entry into waterways, sewers, basements, and confined spaces. Build embankments and collect water for digestion.
	Absorb spills with inert material (e.g., dry sand or soil) and place in chemical waste container.
	Absorb liquids and wash contaminated areas with detergent and water.
	Cover with dry sand/soil or other non-flammable substances and cover with plastic sheets to prevent spreading and contact with rain.
	In the event of a large leak, keep it away from the liquid leak and create a ditch.
	In case of a large leak, wet it with water and clean the ditch later. Place the leak in a clean, dry container with a clean shovel, close loosely, and move the container away from the leak area.

7. HANDLING AND STORAGE METHOD

A. Safety handling tips.	Do not handle all safety precautions until you have read and understood them.
	Do not put air in contact.
	Use electrical, ventilation, lighting, (...) and equipment to prevent explosions.
	Use only tools that do not cause sparks.

	Take anti-static measures.
	Avoid inhalation of dust, fume, gas, mist, steam, spray.
	Wash the handling area thoroughly after handling.
	Handle only outdoors or in well ventilated areas.
	Do not apply pressure, cut, weld, solder, bond, pierce, grind or expose to heat, flame, flame, static or other sources of ignition.
	Follow all MSDS/label precautions as the product may remain after the container has been emptied.
	Handle/Save carefully.
	Carefully open the cap before opening.
	Avoid prolonged or continuous skin contact.
	Be sure to ground all equipment when handling substances.
	Pay attention to substances and conditions to avoid
	Be careful because it may explode during dust generation or frictional operations
	Pay attention to the heat.
	Measure and ventilate oxygen concentrations in the air while working in a low-lying enclosed space as there is a risk of oxygen deficiency.
B. Safe Storage Methods	Stay away from fever, spark, flame, high fever - No smoking
	Store containers tightly sealed in well ventilated areas.
	Store in a well-ventilated place and keep it low.
	Store substances below the appropriate temperature as they may ignite naturally when exposed to room temperature or slightly elevated air.
	Drain and properly seal the empty drum barrel and immediately return it to the drum regulator or place it properly.

8. Exposure Prevention and Personal Protection

A. Exposure criteria for chemicals, biological exposure criteria, etc.

domestic regulations

Silicon oxide (crystalline quartz)	TWA - 0.05mg/m3
titanium dioxide	TWA - 10 mg/m3 Carcinogenic 2
Xylene	TWA - 100ppm STEL - 150ppm
Ethylbenzene	TWA - 100ppm STEL - 125ppm
Isobutyl alcohol	TWA - 50ppm
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic	No data
Zirconium	TWA - 5mg/m3 STEL - 10mg/m3

ACGIH Regulations

Silicon oxide (crystalline quartz)	TWA 0.025 ㎎/㎥
titanium dioxide	TWA 10 ㎎/㎥
Xylene	STEL 150 ppm
Xylene	TWA 100 ppm
Ethylbenzene	TWA 20 ppm
Isobutyl alcohol	TWA 50 ppm
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	Not applicable.
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic	No data
Zirconium	STEL 10 ㎎/㎥
Zirconium	TWA 5 ㎎/㎥

Biological exposure criteria

Silicon oxide (crystalline quartz)	No data
titanium dioxide	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)
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	Not applicable.
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic	No data
Zirconium	No data
Other Exposure Criteria	
Silicon oxide (crystalline quartz)	No data

B. Proper engineering management

- For workplaces that emit gas, steam, mist, fume or dust, it is recommended that the concentration contained in the air does not exceed the level of health hazard.

Intimacy

C. Personal protective gear

○ Respiratory protection

- Respiratory protection is classified from minimum to maximum concentration.
- Consider warning characteristics before use.
- gas mask (for direct compact, organic compounds)
- Air filtration type respirator (purification tank for organic compounds and front type)
- In case of unknown concentration or other imminent danger to life or health: transmission mask (complex air line mask), air respirator (front type)
- If there is a possibility of direct exposure or exposure to the substance, wear a gas mask certified by the Korea Occupational Safety and Health Agency.

○ Eye protection

- Safety glasses for chemicals certified by the Korea Occupational Safety and Health Agency in case of possible harm due to direct exposure or potential exposure to the substance to wear
- Install washing and emergency cleaning equipment (shower type) near the workplace.

○ Hand Protection

- Wear protective gloves for suitable chemicals certified by the Korea Occupational Safety and Health Corporation if necessary

○ Physical Protection

- Wear protective clothing or protective clothing for suitable chemicals certified by the Korea Occupational Safety and Health Agency, if necessary

9. PHYSICAL CHEMICAL CHARACTERISTICS

A. Appearance

a personality of a person	LIQUID
Color	GREY
Smell.	No data
C. Odor threshold	No data
D. pH	No data
E. Melting point/fish point	No data
F. Initial boiling point and boiling point range	No data
G. Print shop	No data
Ah. Evaporation rate.	No data
Now. Flammability (solid, gas)	No data
J. Upper/lower limits of the range of prints or explos	No data
C. Vapor pressure	No data
Get in. Solubility.	No data
Par. Steam density	No data
Ha. Weight	No data
n-octanol/water distribution coefficient (Kow)	No data
You. Natural ignition temperature.	No data
More. Decomposition temperature	No data

R. Viscosity	50 ~ 70
M. molecular weight	No data

10. Stability and Reactivity

A. Chemical stability and potential for hazardous reactions

Silicon oxide (crystalline quartz)	Can decompose at high temperatures to produce toxic gases
Silicon oxide (crystalline quartz)	Containers may explode when heated
Silicon oxide (crystalline quartz)	Some may burn but do not ignite easily
Silicon oxide (crystalline quartz)	Non-inflammatory, the substance itself does not burn, but may decompose during heating, resulting in corrosive/toxic fume
titanium dioxide	Can decompose at high temperatures to produce toxic gases
titanium dioxide	Containers may explode when heated
titanium dioxide	Some may burn but do not ignite easily
titanium dioxide	Non-inflammatory, the substance itself does not burn, but may decompose during heating, resulting in corrosive/toxic fume
Xylene	Highly flammable liquids and vapors
Xylene	Can cause fire and explosion due to intense polymerization
Xylene	Explosive mixture may be formed at or above the ignition point
Xylene	Containers may explode when heated
Xylene	Highly flammable: easily ignited by heat, sparks and flames
Xylene	Leaks are at risk of fire/explosion
Xylene	Risk of vapor explosion in indoor, outdoor, and sewer systems
Xylene	Steam can form explosive mixtures with air
Xylene	Steam can be moved to the ignition source to flash back
Xylene	Steam can cause dizziness or suffocation without awareness
Xylene	May cause irritable, corrosive and toxic gases in case of fire
Xylene	Stimulates or burns skin and eyes during inhalation and contact
Xylene	May be toxic during inhalation and skin absorption
Ethylbenzene	Highly flammable liquids and vapors
Ethylbenzene	Can cause fire and explosion due to intense polymerization
Ethylbenzene	Explosive mixture may be formed at or above the ignition point
Ethylbenzene	Containers may explode when heated
Ethylbenzene	Highly flammable: easily ignited by heat, sparks and flames
Ethylbenzene	Leaks are at risk of fire/explosion
Ethylbenzene	Risk of vapor explosion in indoor, outdoor, and sewer systems
Ethylbenzene	Steam can form explosive mixtures with air
Ethylbenzene	Steam can be moved to the ignition source to flash back
Ethylbenzene	May be toxic during inhalation and skin absorption
Isobutyl alcohol	Flammable liquids and vapors
Isobutyl alcohol	Can cause fire and explosion due to intense polymerization
Isobutyl alcohol	Explosive mixture may be formed at or above the ignition point
Propylene glycol monomethyl ether acetic acid	Steam can cause dizziness or suffocation without awareness
Propylene glycol monomethyl ether acetic acid	May cause irritable, corrosive and toxic gases in case of fire
Propylene glycol monomethyl ether acetic acid	Stimulates or burns skin and eyes during inhalation and contact
N-methylmorpholine	Highly flammable liquids and vapors
N-methylmorpholine	Can cause fire and explosion due to intense polymerization
N-methylmorpholine	Explosive mixture may be formed at or above the ignition point
N-methylmorpholine	Containers may explode when heated
N-methylmorpholine	Leaks are at risk of fire/explosion
N-methylmorpholine	Risk of vapor explosion in indoor, outdoor, and sewer systems
N-methylmorpholine	Can ignite by heat, spark, flame
N-methylmorpholine	flammable/combustible materials
N-methylmorpholine	Steam can be moved to the ignition source to flash back
N-methylmorpholine	Serious burns to the skin and eyes during contact
N-methylmorpholine	Steam can cause dizziness or suffocation without awareness

N-methylmorpholine	May cause irritable, corrosive and toxic gases in case of fire
N-methylmorpholine	May be toxic when inhaled and ingested
Propylene glycol	Containers may explode when heated
Propylene glycol	Some may burn but do not ignite easily
Propylene glycol	Non-inflammatory, the substance itself does not burn, but may decompose during heating, resulting in corrosive/toxic fume
Propylene glycol	May cause irritable, corrosive and toxic gases in case of fire
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 do not ignite easily
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	Non-inflammatory, the substance itself does not burn, but may decompose during heating, resulting in corrosive/toxic fume
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(QUATERNARY AMMONIUM...	May cause irritable, corrosive and toxic gases in case of fire
Zirconium	Flammable solids
Zirconium	Unstable at room temperature
Zirconium	Can cause fire and explosion due to intense polymerization
Zirconium	Containers may explode when heated
Zirconium	Leaks are at risk of fire/explosion
Zirconium	Can be re-ignited after fire extinguishing
Zirconium	Can ignite when in contact with moisture
Zirconium	flammable/combustible materials
Zirconium	Some substances flash and can burn quickly
Zirconium	Some react violently with water.
B. Conditions to avoid	Some may be exploded upon fire or heating
Silicon oxide (crystalline quartz)	Inhalation of decomposition products may result in serious injury or death
titanium dioxide	Serious burns to the skin and eyes during contact
Xylene	May cause irritable, corrosive and toxic gases in case of fire
Ethylbenzene	
Silicon oxide (crystalline quartz)	sources of heat, sparks, flames, etc.
titanium dioxide	sources of heat, sparks, flames, etc.
Xylene	Stay away from fever, spark, flame, high fever - No smoking
Ethylbenzene	Stay away from fever, spark, flame, high fever - No smoking
Isobutyl alcohol	Stay away from fever, spark, flame, high fever - No smoking
Propylene glycol monomethyl ether acetic acid	Stay away from fever, spark, flame, high fever - No smoking
N-methylmorpholine	Stay away from fever, spark, flame, high fever - No smoking
Propylene glycol	sources of heat, sparks, flames, etc.
Quaternary ammonium compounds, non-hydrogenic	sources of heat, sparks, flames, etc.
Zirconium	Stay away from fever, spark, flame, high fever - No smoking
Zirconium	Moisture
C. Substances to avoid	
Silicon oxide (crystalline quartz)	Flammable substances, reducing substances
titanium dioxide	Flammable substances, reducing substances
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	Flammable substances, reducing substances
Quaternary ammonium compounds, non-hydrogenic	Flammable substances, reducing substances

Zirconium	water
Zirconium	Separation group:
D. Hazardous substances produced during disassembly	
Silicon oxide (crystalline quartz)	Corrosive/toxic fume
Silicon oxide (crystalline quartz)	Irritable, corrosive, toxic gases
titanium dioxide	Corrosive/toxic fume
titanium dioxide	Irritable, corrosive, toxic gases
Xylene	May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Ethylbenzene	May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Isobutyl alcohol	May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Propylene glycol monomethyl ether acetic acid	Irritable, corrosive, toxic gases
N-methylmorpholine	May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Propylene glycol	May cause irritating and highly toxic gases by pyrolysis or combustion during burning
Propylene glycol	Corrosive/toxic fume
Quaternary ammonium compounds, non-hydrogenic r	May cause irritating and highly toxic gases by pyrolysis or combustion during burning

11. Information about toxicity

A. Information about likely exposure pathways	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	"When exposed, it causes irritation, difficulty breathing, and lung congestion.
Propylene glycol	Causes irritation, zone, stomachache when exposed.
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Causes irritation (sometimes severe) on exposure.
Zirconium	Exposure causes burns."
B. Health Hazard Information	No data
	"May cause irritation to the respiratory tract
Acute toxicity	Eye contact may cause irritation"
epigram	No data
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	LD50 > 5000 mg/kg Mouse (OECD TG 420)
Ethylbenzene	LD50 3523 mg/kg Rat (EU Method B1)
Isobutyl alcohol	LD50 3500 mg/kg Rat
Propylene glycol monomethyl ether acetic acid	LD50 > 2830 mg/kg Rat (OECD Guideline 401, EPA OTS 798.1175, GLP)
N-methylmorpholine	LD50 8532 mg/kg Rat
Propylene glycol	LD50 1960 mg/kg Rat
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	LD50 22000 mg/kg Rat
Zirconium	LD50 > 5000 mg/kg Rat
Transdermal construction	"LD50 > 5000 mg/kg Rat (OECD TG 423, GLP
Silicon oxide (crystalline quartz)	Female)"
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data

Isobutyl alcohol	LD50 15400 ㎎/㎏ Rabbit
Propylene glycol monomethyl ether acetic acid	LD50 > 2000 ㎎/㎏ Rabbit (LD50= 2460mg/kg bw, 사망없음, OECD Guideline 402, EPA OTS 798.1100, GLP)
N-methylmorpholine	LD50 > 5000 ㎎/㎏ Rabbit
Propylene glycol	LD50 1242 ㎎/㎏ Rabbit
titanium dioxide	LD50 > 16000 ㎎/㎏ Rabbit
N-methylmorpholine	No data
Propylene glycol	Steam LC50 > 4345 ppm 6 hr Rat (no death observed at the concentration. (Applies gas reference as it is a vapor close to the gas phase)
Ethylbenzene	Steam LC50 25200 £/£ 2 hr Mouse (4307 ppm/4h [Applies gas reference value below 90% of saturated vapor pressure concentration])
Isobutyl alcohol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	분진 LC50> 12.6 ㎎/ℓ 4 hr Rat (GLP data)
Zirconium	"Dust LC50> 4.3 £/£ 4 hr Rat (similar substance CAS No. 1314-23-4)
Skin corrosive or irritability	OECD TG 436, GLP)"
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	Skin corrosivity/irritability test using rabbits does not show irritation, = 0, OECD TG 404
Ethylbenzene	Skin irritation test using rabbits. EU Method B.4 Result 1st Skin Irritation Index 3 for moderate irritation.
Isobutyl alcohol	Skin irritation test using rabbits shows moderate irritation
Propylene glycol monomethyl ether acetic acid	Skin irritation/corrosivity experiments with rabbits show non-reversible irritation, OECD Guideline 404, EPA OTS 798.4470, GLP
N-methylmorpholine	Rabbit: No irritation
Propylene glycol	UN Corrosive Substances
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Skin irritation test results (rabbit) non-irritability
Zirconium	No irritation to the skin
Severe eye damage or irritability	As a result of skin corrosivity/irritability tests on rabbits, no irritation reaction occurs during the observation period Similar substances: 1314-23-4 OECD TG
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	Severe eye damage/stimulation test using rabbits, no irritation. Conjunctival incidence index = 1-2, OECD TG 405, GLP
Ethylbenzene	Effects of eye and respiratory irritation on the human body exposed to mixed xylene of 100 ppm STEL based on short-term exposure
Isobutyl alcohol	No minor irritation, corneal damage to the conjunctiva as a result of eye irritation tests in rabbits.
Propylene glycol monomethyl ether acetic acid	As a result of eye irritation test on rabbits, severe eye irritation. Irreversible (EPAOTS 798.4500, OECD Guideline 405, GLP)
N-methylmorpholine	Rabbit: weak irritability
Propylene glycol	UN Corrosive Substances
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Eye irritation test results (rabbit) Very weak irritation
Zirconium	Intermediate eye irritation observed in animal experiments
Respiratory hypersensitivity	causing irritation to the eyes
Silicon oxide (crystalline quartz)	
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
Dermatotropic	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	Skin Irritability Test Results Using Guinea Pigs Does Not Cause Skin Irritability, OECD TG 403
Xylene	Mouth Local Lymph node test OECD TG 429 Inertia

Propylene glycol monomethyl ether acetic acid	Guinea pig/maximization test (GLP): No hypersensitivity
N-methylmorpholine	No data
Propylene glycol	People/Draize Test: Not Irritable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Does not cause skin irritation
Zirconium	As a result of the dermatological test on guinea pigs, similar substances without dermatological sensitivity: 1314-23-4 OECD TG 406
Carcinogenic	
Industrial Safety and Health Act	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
Ministry of Employment and Labor Notice	
Silicon oxide (crystalline quartz)	1A
titanium dioxide	2
Xylene	No data
Ethylbenzene	2
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
OSHA	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
ACGIH	
Silicon oxide (crystalline quartz)	A2
titanium dioxide	A4

Xylene	A4
Ethylbenzene	A3
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	A4
NTP	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Isobutyl alcohol	No effect on developmental toxicity test result of rat (female) NOAEL: 10 mg/Lair (OECD Guideline 414 (Prenatal Developmental Toxicity Study), GLP)
Propylene glycol monomethyl ether acetic acid	"Rats/Oral (0, 100, 300, 1000 mg/kg/day for 44D (M) and 41-45D(F))) (GLP): no toxic effects on reproductive variables
N-methylmorpholine	Rats/Inhalation (500, 2000, 4000 ppm for 21D) (GLP): No malformation or other toxic effects."
Propylene glycol	Toxic data present.
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	"There was no effect of modification rate on dietary administration for 10 days at 1230 mg/kg in the pregnancy labit and no effect of survival rate in the fetus or mother body.
Zirconium	Prenatal toxicity without maternal toxicity is the largest indicator of skeletal and malformed occurrence, with mice observed at £500 mg/kg/day and rats at £ 1,000 mg/kg/day. The effect of the weight and survival rate of the Crown occurs at higher concentrations."
	No data
	No data
Specific target organ toxicity (1 exposure)	
Silicon oxide (crystalline quartz)	As a result of acute inhalation toxicity test using humans, respiratory system is affected
titanium dioxide	As a result of acute oral toxicity test using rats, no death, no significant lesions were observed during weight changes and autopsy. OECD TG 425
Xylene	Dizziness reported in humans, significant awakening, progression, and anesthesia in the experimental animals. Exposure to 100 ppm442 mg/£ in humans weak irritation to the eyes and upper airway and slight central nervous
Ethylbenzene	Causes central nervous system effects and airway irritation in experimental anima
Isobutyl alcohol	Acute toxicity (transcutaneous) test results in rabbits (cancer/water) showed erythema, edema, necrosis, hematopoietic hemorrhage, delamination, scab, and hair loss LD50 > 2000 mg/kg bw (OECD TG 402, GLP)
Propylene glycol monomethyl ether acetic acid	Rats (male, female) / oral (500, 1000, 2000, 4000, 6300, 100000 mg/kg): lethargy (climbing), filoeration (mouth), watery eyes, anorexia, shadow baking, and salivation are observed.
Specific target organ toxicity (repeated exposure)	
Silicon oxide (crystalline quartz)	The results of repeated toxicity tests using humans show effects on the respiratory system and kidneys. Does not apply to classification in this section due to carcinogenic effects
titanium dioxide	As a result of repeated oral toxicity test using rats, no death and no significant impact was observed. NOAEL= 24,000 mg/kg bw/dayOECD TG 407
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Repeated exposure results NOAEL (12-week rat) = approx. 12,500-25,000 mg/kg-bw/day

Zirconium	Inhalation repeat target long-term systemic toxicity test results in no mortality, growth, biochemical or hematological changes NOAEC > 11 mg/m3 Similar Substances: 1314-23-4 OECD TG 413
Aspiration hazard	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	Hydrocarbon, equivalence rate 0.603 mPa s 25℃
Ethylbenzene	Hydrocarbons. Swallowing liquids can cause chemical pneumonia by misfire. Tied rate 0.64 £/s 25 ℃
Isobutyl alcohol	Viscosity 4 mPa (dynamic) 20 °C, molecular structure C4H10O
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
Other Harmful Effects	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data

12. Environmental impact

A. Ecotoxicity.	
Fish	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	LL50 > 100 ㎎/ℓ 96 hr Oryzias latipes (OECD Guideline 203)
Xylene	LC50 2.6 ㎎/ℓ 96 hr (OECD Guideline 203)
Ethylbenzene	LC50 5.1 ㎎/ℓ 96 hr
Isobutyl alcohol	LC50 1430 ㎎/ℓ 96 hr Pimephales promelas
Propylene glycol monomethyl ether acetic acid	LC50 ≥ 100 ㎎/ℓ 96 hr Oryzias latipes
N-methylmorpholine	LC50 889.128 ㎎/ℓ 96 hr
Propylene glycol	LC50 710 ㎎/ℓ 96 hr Oncorhynchus mykiss
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	LL50 > 100 ㎎/ℓ 96 hr Brachydanio rerio (**유사물질**: 1314-23-4, OECD Guideline
Crustaceans	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	EC50 > 100 ㎎/ℓ 48 hr Daphnia magna (48h-EL50Daphnia magna>100 mg/L, 48h-EC50>100, 48h-EC10=91.2 mg/L, OECD TG 202)
Xylene	LC50 3.6 ㎎/ℓ 24 hr (OECD TG202)
Ethylbenzene	LC50 1.8 ~ 2.4 ㎎/ℓ 48 hr Mysidopsis bahia (EC5048hr>5.2mg/L, EPA 1985, GL
Isobutyl alcohol	EC50 1100 ㎎/ℓ 48 hr Daphnia magna
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	"EC50 > 100 £/£ 48 hr Daphnia magna (similar substance CAS No. 1314-23-4)
bird	EU Method C.2, GLP)"
Silicon oxide (crystalline quartz)	

titanium dioxide	No data
Xylene	ErL50 > 100 £/£ 72hr Other (Pseudokircneriella subcapitata, Growth Rate, Exponential Expression, 72h-EyL50 > 100 mg/L Exponential Expression, OECD TG 201)
Ethylbenzene	EC50 1.3 ㎎/ℓ 48 hr (OECD TG201, GLP)
Isobutyl alcohol	EC50 3.6 ㎎/ℓ 96 hr (EPA 1985, GLP)
Propylene glycol monomethyl ether acetic acid	EC50 593 ㎎/ℓ 72 hr Selenastrum capricornutum
N-methylmorpholine	EC50 ≥ 1000 ㎎/ℓ 72 hr Selenastrum capricornutum
Propylene glycol	EC50 40.632 ㎎/ℓ 96 hr
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	No data
Ethylbenzene	log Kow 3.15
Isobutyl alcohol	log Kow 3.15
Propylene glycol monomethyl ether acetic acid	log Kow 10
N-methylmorpholine	log Kow 0.43
Propylene glycol	log Kow -0.33
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	log Kow -0.92
Zirconium	No data
Decomposable	log Kow -0.57 (estimated)
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	(No data.)
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
C. Bio-enriched	No data
Concentration	
Biodegradable	No data
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	No data
Ethylbenzene	90% 28 days (Disoluble, OECD TG301F, GLP)
Isobutyl alcohol	70 ~ 80 % 28 day (ISO 14593 CO2 headspace시험, GLP)
Propylene glycol monomethyl ether acetic acid	70 ~ 80 % 28 day
N-methylmorpholine	> 60 (%) 28 day
Propylene glycol	(No data.)
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	> 60 (%) 10 day
Zirconium	No data
D. Soil dynamic	No data
Silicon oxide (crystalline quartz)	
titanium dioxide	No data
Xylene	No data
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data

Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
E. Other harmful effects	No data
Silicon oxide (crystalline quartz)	
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data

13. Precautions for disposal

A. Disposal method	
Silicon oxide (crystalline quartz)	"Take care of it in one of the following ways: 1. Solidify. 2. Land in a managed landfill facility where designated waste can be reclaimed. 3. Incinerate the waste catalyst including flammable substances. 4. In case of incineration of a lung catalyst containing substances equivalent to the halogen class, incinerate it at high temperature."
titanium dioxide	No data
Xylene	"Take care of it in one of the following ways: 1. Incinerate. 2. After processing it by evaporating and concentrating, incinerate the residue. 3. After purification by separation, distillation, extraction, and filtration, incinerate the residue. 4. Use the reaction of neutralization, oxidation, reduction, polymerization, and accumulation. 5. Incinerate the remnants or dispose of them again by means of agglomeration, sedimentation, filtration and dehydration, and incinerate the
Ethylbenzene	"Take care of it in one of the following ways: 1. Use the reaction of neutralization, oxidation, and redemption, and then process them by cohesion, sedimentation, filtration, and dehydration. 2. Process by evaporating and concentrating. 3. Refine by separation, distillation, extraction and filtration."
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	1) If oil and water can be separated, pre-treated by separating oil and water.
N-methylmorpholine	Dispose of the contents and containers according to the regulations provided for in the Waste Management Act.
Propylene glycol	Dispose of the contents and containers according to the regulations provided for in the Waste Management Act.
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Dispose of the contents and containers according to the regulations provided for in the Waste Management Act.
Zirconium	"Take care of it in one of the following ways: 1. Burn it at high temperature. 2. After recovering the recyclable materials such as organic solvents, incinerate the remaining materials at high temperatures."
B. Precautions for disposal	
Silicon oxide (crystalline quartz)	Dispose of the container (in accordance with the relevant laws and regulations).
titanium dioxide	Dispose of the container (in accordance with the relevant laws and regulations).
Xylene	Dispose of the container (in accordance with the relevant laws and regulations).
Ethylbenzene	Dispose of the container (in accordance with the relevant laws and regulations).
Isobutyl alcohol	Dispose of the container (in accordance with the relevant laws and regulations).
Propylene glycol monomethyl ether acetic acid	Dispose of the container (in accordance with the relevant laws and regulations).
N-methylmorpholine	Dispose of the container (in accordance with the relevant laws and regulations).
Propylene glycol	Dispose of the container (in accordance with the relevant laws and regulations).

Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Dispose of the container (in accordance with the relevant laws and regulations).
Zirconium	Dispose of the container (in accordance with the relevant laws and regulations).

14. Information required for transportation

A. United Nations number (UN No.)	1263
B. Proper shipping name	Paint including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler, and liquid lacquer base
C. Risks in transportation	3
D. Courage grade	III
E. Marine pollutants.	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
F. Special safety measures that users need to know or need to know about transportation or transportation;	
Emergency measures in case of fire	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	F-E
Ethylbenzene	F-E
Isobutyl alcohol	F-E
Propylene glycol monomethyl ether acetic acid	F-E
N-methylmorpholine	F-E
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	F-G
Emergency measures in case of leakage	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	S-D
Ethylbenzene	S-D
Isobutyl alcohol	S-D
Propylene glycol monomethyl ether acetic acid	S-D

15. Status of legal regulations

A. Regulations under the Occupational Safety and Health Act	
Silicon oxide (crystalline quartz)	Substances subject to measurement of working environment (Measurement cycle: 6 months)
Silicon oxide (crystalline quartz)	Substances subject to special health examination (Diagnosis cycle: 24 months)
Silicon oxide (crystalline quartz)	Exposure reference setting substance
titanium dioxide	Hazardous substances subject to management
titanium dioxide	Substances subject to measurement of working environment (Measurement cycle: 6 months)
titanium dioxide	Exposure reference setting substance
Xylene	Substances subject to process safety report (PSM) submission
Xylene	Hazardous substances subject to management
Xylene	Substances subject to measurement of working environment (Measurement cycle: 6 months)
Xylene	Substances subject to special health examination (Diagnosis cycle: 12 months)
Ethylbenzene	Substances subject to special health examination (Diagnosis cycle: 12 months)
Ethylbenzene	Exposure reference setting substance
Isobutyl alcohol	Substances subject to process safety report (PSM) submission
Isobutyl alcohol	Hazardous substances subject to management

Isobutyl alcohol	Substances subject to measurement of working environment (Measurement cycle: 6 months)
Isobutyl alcohol	Substances subject to special health examination (Diagnosis cycle: 12 months)
Isobutyl alcohol	Exposure reference setting substance
Propylene glycol monomethyl ether acetic acid	Substances subject to process safety report (PSM) submission
N-methylmorpholine	Substances subject to process safety report (PSM) submission
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	Hazardous substances subject to management
Zirconium	Substances subject to measurement of working environment (Measurement cycle: 6 months)
Zirconium	Substances subject to special health examination (Diagnosis cycle: 12 months)
Zirconium	Exposure reference setting substance
B. Regulations under the Chemical Substances Control Act	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	toxic substances
Ethylbenzene	No data
Isobutyl alcohol	No data
Propylene glycol monomethyl ether acetic acid	No data
N-methylmorpholine	No data
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	No data
C. Regulations under the Dangerous Goods Safety Management Act	
Silicon oxide (crystalline quartz)	No data
titanium dioxide	No data
Xylene	Fourth-class second-class petroleum (non-waterable) 1000L
Ethylbenzene	4th class 1st petroleum (non-waterable) 200L
Isobutyl alcohol	Fourth-class second-class petroleum (non-waterable) 1000L
Propylene glycol monomethyl ether acetic acid	Fourth-class second-class petroleum (non-waterable liquid) 1000 liters.
N-methylmorpholine	4th class 1st petroleum (water-soluble liquid) 400£
Propylene glycol	4th class 3rd petroleum (water-soluble liquid) 4000£
Quaternary ammonium compounds, non-hydrogenic	No data
Zirconium	500kg of second-rate metal.
D. Regulations under the Waste Management Act	
Silicon oxide (crystalline quartz)	designated waste
N-methylmorpholine	designated waste
Propylene glycol	No data
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	No data
Zirconium	designated waste
E. Other regulations under domestic and foreign law	
domestic regulations	
Other domestic regulations	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable

N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
Foreign regulations	
US Management Information (OSHA Regulations)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
US Management Information (CERCLA Regulations)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	45.3599kg 100lb
Ethylbenzene	453.599kg 1000lb
Isobutyl alcohol	2267.995kg 5000lb
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
US Management Information (EPCRA 304 Regulations	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
US Management Information (EPCRA 313 Regulations)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Applicable
Ethylbenzene	Applicable
Isobutyl alcohol	Not Applicable

Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
US Management Information (Montreal Emotional Material)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	Not Applicable
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable
EU Classification Information (Confirmed Classification Result)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
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
Isobutyl alcohol	Flam. Liq. 3 STOT SE 3 STOT SE 3 Skin Irrit. 2 Eye Dam. 1
Propylene glycol monomethyl ether acetic acid	R10Xi; R36
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Pyr. Sol. 1 Water-react. 1
EU Classification Information (Risk Statements)	
Silicon oxide (crystalline quartz)	Not Applicable

titanium dioxide	Not Applicable
Xylene	H226 H332 H312 H315
Ethylbenzene	H225 H332 H304 H373 (hearing organs)
Isobutyl alcohol	H226 H335 H336 H315 H318
Propylene glycol monomethyl ether acetic acid	R10, R36
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	H250 H260
EU Classification Information (Safety Statement)	
Silicon oxide (crystalline quartz)	Not Applicable
titanium dioxide	Not Applicable
Xylene	Not Applicable
Ethylbenzene	Not Applicable
Isobutyl alcohol	Not Applicable
Propylene glycol monomethyl ether acetic acid	S2, S25
N-methylmorpholine	Not Applicable
Propylene glycol	Not Applicable
Quaternary ammonium compounds, non-hydrogenic resin alkyl dimethyl, and quaternary AMMONIUM...	Not Applicable
Zirconium	Not Applicable

16. Other Notes

A. Source of data

Silicon oxide (crystalline quartz)

IPCS (Property)

IPCS (Color)

IPCS (B. Smell)

IPCS (E. melting point/fish point)

IPCS (bar. Initial boiling point and boiling point range)

ICSC (E. melting point/fish point)

ICSC (Bar. Initial Boiling and Boiling Point Range)

CAMEO Chemicals (Car. Vapor Pressure)

CAMEO Chemicals (Ta. Solubility)

OSHA (Lower. Percentage)

pubchem (mer. molecular weight)

OECD SIDS (Eral)

ECHA (Inhalation)

OECD SIDS (skin corrosion or irritation)

Severe eye damage or irritability (ECHA)

OECD SIDS (Skin Irritability)

OECD SIDS (Growth Cell Variational Origin)

OECD Probiotic Toxicity (SIDS)

OECD SIDS (Specific Targeted Organ Toxicity (one exposure)

OECD SIDS (Specific Targeted Organ Toxicity (Repeat Exposure))

ECHA (Tidal Current)

Xylene
HSDB (Nature)
HSDB (Color)
HSDB (B. Smell)
HSDB (C. Odor threshold)
HSDB (E. melting point/fish point)
ICSC (Bar. Initial Boiling and Boiling Point Range)
ECHA (Company Print Point)
SRC (Tea. Upper/lower limit of flammable or explosive range)
SRC (Car. Vapor Pressure)
HSDB (Other. Solubility)
HSDB (wave. steam density)
ICSC (Lower. Weight)
HSDB (n. octanol/water distribution coefficient (Kow))
SRC (you. natural ignition temperature)
pubchem (mer. molecular weight)
ECHA (Eural)
ECHA (Inhalation)
ECHA (skin-corrosive or irritable)
Severe eye damage or irritability (ECHA)
ECHA (Skin Irritability)
ECHA (Growth Cell Variational Origin)
ECHA (Breathe Toxicity)
HSDB, IPCS, ECHA (specific target organ toxicity (1 exposure))
ECHA (Specific Targeted Organ Toxicity (Repeat Exposure)
ECHA (concentration)
ECHA (Biodegradable)

HSDB (Color)
HSDB (B. Smell)
HSDB (C. Odor threshold)
ICSC (E. melting point/fish point)
ICSC (Bar. Initial Boiling and Boiling Point Range)
ICSC (company. printing point)
ICSC (Limit. Upper/lower limit of flammable or explosive range)
HSDB (Car. Vapor Pressure)
ICSC (Tar. Solubility)
HSDB (wave. steam density)
HSDB (lower. weight)
HSDB (n. octanol/water distribution coefficient (Kow))
ICSC (you. natural ignition temperature)
HSDB (r. viscosity)
HSDB (mer. molecular weight)
ECHA, HSDB (Eral)
ECHA, ChemIDPLUS(경피)
ECHA (Inhalation)
ECHA (skin-corrosive or irritable)
Severe eye damage or irritability (ECHA)
ECHA (Growth Cell Variational Origin)
ECHA (Breathe Toxicity)
HSDB (specific target organ toxicity (1 exposure))
ECHA (Specific Targeted Organ Toxicity (Repeat Exposure)
Hydrocarbons. Swallowing liquids can cause chemical pneumonia by misfire. Tied rate 0.64 £/s 25 ℃ (intrusive hazard)

ECHA (Fish)
ECHA (Capsule)

ECHA (Tidal Current)
HSDB (residuity)
ECHA (concentration)
ECHA (Biodegradable)
ECHA(D. Soil Dynamic)
ECHA (E. Other harmful effects)
Isobutyl alcohol
ECHA (Nature)
ECHA (Color)
ECHA (B. Smell)
ChemIDPlus (E. melting point/fish point)
ChemIDPlus (n-octanol/water distribution coefficient (Kow))
ECHA (you. natural ignition temperature)
ECHA (r. viscosity)
Chemical book (mer. molecular weight)
ECHA (skin-corrosive or irritable)
Severe eye damage or irritability (ECHA)
ECHA (Skin Irritability)
ECHA (Growth Cell Variational Origin)
ECHA (Breathe Toxicity)
ECHA (specific target organ toxicity (1 exposure))
ECHA (Specific Targeted Organ Toxicity (Repeat Exposure)
Viscosity 4 mPas (dynamic) 20 °C, molecular structure C4H10O (intrusive)
ECHA (Fish)
ECHA (Capsule)
ECHA (Tidal Current)
ECHA (Remainability)
ECHA (Biodegradable)
ECHA (E. Other harmful effects)

Propylene glycol monomethyl ether acetic acid

ECHA(피부부식성 또는 자극성)
ECHA(심한 눈손상 또는 자극성)
ECHA(피부과민성)
ECHA(생식세포변이원성)
ECHA (생식독성)
ECHA(특정 표적장기 독성 (1회 노출))
ECHA(특정 표적장기 독성 (반복 노출))
점도 4 mPa s (dynamic) 20 °C, 분자구조 C4H10O (흡인유해성)
ECHA(어류)
ECHA(갑각류)
ECHA(조류)
ECHA(잔류성)
ECHA(생분해성)
ECHA(마. 기타 유해 영향)

프로필렌 글리콜 모노메틸 에테르 아세트산

The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)(성상)
The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)(색상)
The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)(나. 냄새)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(마. 녹는점/어는점)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(바. 초기 끓는점과 끓는점 범위)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(사. 인화점)

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(차. 인화 또는 폭발 범위의 상한/하한)
National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(카. 증기압)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(타. 용해도)
Intermational Programme on Chemical Safety(IPCS INCHEM)(http://www.inchem.org/)(파. 증기밀도)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(하. 비중)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(거. n-옥탄올/물분배계수 (Kow))
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(너. 자연발화온도)
The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)(머. 분자
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(피부과민성)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(생식세포변이원성)
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(생식세포변이원성)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(생식독성)
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(생식독성)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(특정 표적장기 독성 (1회 노출))
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(특정 표적장기 독성 (1회 노출))
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(특정 표적장기 독성 (반복 노출))
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(특정 표적장기 독성 (반복 노출))
SIDS(어류)
SIDS(갑각류)
SIDS(조류)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(잔류성)
OECD Screening Information Data Set(http://cs3-hq.oecd.org/scripts/hpv/)(생분해성)

N-메틸모르폴린

NLM,THOMSON(경구)
THOMSON(경피)
RTECS(흡입)
THOMSON(특정 표적장기 독성 (반복 노출))
ECOSAR(어류)
ECOSAR(갑각류)
ECOSAR(조류)

프로필렌 글리콜

ICSC(성상)
ICSC(색상)
ICSC(나. 냄새)
ICSC(마. 녹는점/어는점)
ICSC(바. 초기 끓는점과 끓는점 범위)
ICSC(사. 인화점)
ICSC(차. 인화 또는 폭발 범위의 상한/하한)
ICSC(카. 증기압)
ChemIDplus(타. 용해도)
ICSC(파. 증기밀도)

ICSC(하. 비중)

ICSC(거. n-옥탄올/물분배계수 (Kow))
ICSC(너. 자연발화온도)
The Chemical Database, The Department of Chemistry at the University of Akron(http://ull.chemistry.uakron.edu/erd)(더. 분해
HSDB(러. 점도)
ICSC(머. 분자량)
SIDS(경구)
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(경피)
SIDS(피부부식성 또는 자극성)
SIDS(심한 눈손상 또는 자극성)
Intermational Programme on Chemical Safety(IPCS INCHEM)(http://www.inchem.org/)(피부과민성)
National Library of Medicine/Chemical Carcinogenesis Research Information
National Library of Medicine/genetic toxicology(NLM/GENETOX)(http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?GENETOX)(생식
National Library of Medicine/Agency for Toxic Substances and Disease

International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(특정 표적장기 독성 (1회 노출))
International Uniform ChemicaL Information Database(IUCLID)(http://ecb.jrc.it/esis)(특정 표적장기 독성 (반복 노출))
ECOTOX(어류)
ECOTOX(갑각류)
National Institute of Technology and Evaluation(NITE)(http://www.safe.nite.go.jp/ghs/h18_bunrui.html)(조류)
ICSC(잔류성)
SIDS(농축성)
SIDS(생분해성)
4차 암모늄 화합물, 비스(수소산 수지 알킬) 다이메틸, 벤토나이트와의 염(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/)(가. 가능성이 높은 노출 경로에 관한 정보)
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(피부부식성 또는 자극성)
SIDS(심한 눈손상 또는 자극성)
SIDS(피부과민성)
SIDS(특정 표적장기 독성 (반복 노출))
Seton compliance resource center(http://www.setonresourcecenter.com/MSDSs)
지르코니움
ICSC(성상)
ICSC(색상)
ICSC(마. 녹는점/어는점)
ICSC(바. 초기 끓는점과 끓는점 범위)
ICSC(자. 인화성(고체, 기체))
ICSC(타. 용해도)
ICSC(하. 비중)
QSAR(거. n-옥탄올/물분배계수 (Kow))
HSDB(머. 분자량)
ECHA(경구)
ECHA(흡입)
ECHA(피부부식성 또는 자극성)
NLM(심한 눈손상 또는 자극성)
ECHA(피부과민성)
ECHA(생식세포변이원성)
(생식독성)
ECHA(특정 표적장기 독성 (반복 노출))
ECHA(어류)
ECHA(갑각류)
QSAR(잔류성)
ECHA(라. 토양이동성)
ECHA(마. 기타 유해 영향)

B. First created date 2020-02-03
C. Number of revisions and final revision date
Revised number of times 1
Final revision date 2024-03-25
D. Other

" ○ The prepared Material Safety Data Sheet (MSDS) shall be edited and partially modified by referring to the MSDS provided by the Korea Occupational Safety and Health Corporation.

Here's the data."