

# MATERIAL SAFETY DATA SHEET

## 1. Identification of the substance or mixture and of the supplier

- A. GHS product identifier** FIRSTCLASS HIGH GLOSS WAX  
**B. Recommended use of the chemical and restrictions on use**  
**Recommended use** Polishing for Automobile  
**Restrictions on use** Limitation of use for other purpose  
**C. Manufacturers**  
**Company name** Bullstone  
**Address** 7F, Dabong Tower, 418, Teheran-roGangnam-gu, Seoul, 135-839, Korea  
**Emergency phone number** 822-2106-7777  
**Respondent** Han Dong Jin  
**Fax** 822-2106-7911

## 2. Hazards identification

- A. GHS classification of the substance/mixture**  
 Specific target organ toxicity (single exposure) : Category 3 (respiratory irritation)  
 Hazardous to the aquatic environment (acute hazard) : Category 3  
 Hazardous to the aquatic environment (chronic) : Category 2  
**B. GHS label elements, including precautionary statements**  
**Pictogram and symbol :**



**Signal word :**Warning

**Hazard statements :**

- H335 May cause respiratory irritation.  
 H402 Harmful to aquatic life.  
 H411 Toxic to aquatic life with long lasting effects.

**Precautionary statements**

**Precaution**

- P261 Avoid breathing dust/fume/gas/mist/vapours/spray.  
 P271 Use only outdoors or in a well-ventilated area.  
 P273 Avoid release to the environment.

**Treatment**

- P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.  
 P312 Call a poison center or doctor/physician if you feel unwell.  
 P391 Collect spillage.

**Storage**

- P403+P233 Store in a well-ventilated place. Keep container tightly closed.  
 P405 Store locked up.

**Disposal**

- P501 Dispose the contents/container in accordance with local/regional/national/international regulations.

**C. Other hazard information not included in hazard classification (NFPA)**

**Health** 2

**Flammability** 1

**Reactivity** Not available

### 3. Composition/information on ingredients

Chemical Name	Common Name(Synonyms)	CAS number	EC number	Content (%)
Water	Dihydrogen oxide Ice Steam Oxidane Sterile purified water	7732-18-5	231-791-2	40~70
Modified acrylic copolymer	Alcohol ethoxylate(CAS No. Confidential)			< 1
CARNAUBA WAX	브라질밀랍(BRAZIL WAX);	8015-86-9	232-399-4	1~5
Tetrahydro-2H-1,4-oxazine	Tetrahydro-2H-1,4-oxazine	110-91-8	203-815-1	1~5
TRIETHANOLAMINE	Triethanolamine DALTOGEN ETHANOL, 2,2',2''-NITRILOTRI- NITRILOTRIETHANOL NITRILO-2,2',2''-TRIETHANOL AMINE, TRIETHYL, 2,2',2''- TRIHYDROXY-	102-71-6	203-049-8	< 1
Polysiloxane	Dimethylpolysiloxane Silastic Silicone oil	63148-62-9	613-156-5	1~10
OLEIC ACID	(9Z)- Octadecenoic acid (Z)-Octadec-9-enoic acid cis-9-Octadecenoic acid (9Z)- Octadecenoic acid (Z)-Octadec-9-enoic acid cis-9-Octadecenoic acid	112-80-1	204-007-1	1~5
Polysiloxane	Tetra (trimethylsiloxy)silane(CAS No. 3555-47-3) Tetra (trimethylsiloxy)silane(CAS No. 3555-47-3)			1~5
Amino modified silicone	Aminoalkoxydimethylpolysiloxane(CAS No. 69430-37-1) Methyl alcohol(CAS No. 67-56-1) Octamethylcyclotetrasiloxane(CAS No. 556-67-2) Aminoalkoxydimethylpolysiloxane(CAS No. 69430-37-1) Methyl alcohol(CAS No. 67-56-1) Octamethylcyclotetrasiloxane(CAS No. 556-67-2)			< 1
C10-14 ISOALKANES	C10-13 ISOALKANES(CAS No.68551-17-7) +C10-14 ISOALKANES(CAS No.68551-18-8)			10~30
Preservatives	1,2-Benzisothiazolin-3-one(CAS No. 2634-33-5) +Propylene glycol(CAS No. 57-55-6) +Sodium hydroxide(CAS No. 1310-73-2) +Water(CAS No. 7732-18-5)			< 0.2
Antimony oxide calcium titanate	Antimony oxide calcium titanate silicate ceramic opacifier Barium, calcium, magnesium, strontium, aluminum silicate flux	66402-68-4	266-340-9	10~20

	Calcined clay Fireclay, calcined Clay bonded mordenite			
Polytetrafluoroethylene powder	Algloflon Balfon 7000 Fluon Teflon	9002-84-0		< 1
Silicon dioxide	Silic anhydride Dioxosilane Quartz	7631-86-9	231-545-4	< 1

#### 4. First aid measures

##### A. Eye contact

- Call emergency medical service.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

##### B. Skin contact

- Call a poison center or doctor/physician if you feel unwell.
- Call emergency medical service.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.

##### C. Inhalation

- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.

##### D. Ingestion

- Call emergency medical service.

##### E. Indication of immediate medical attention and notes for physician

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

#### 5. Fire fighting measures

##### A. Suitable (and unsuitable) extinguishing media

- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.
- Use dry sand or earth to smother fire.

##### B. Specific hazards arising from the chemical

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.

##### C. Special protective equipment and precautions for fire-fighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Substance may be transported in a molten form.
- Some may be transported hot.
- Dike fire-control water for later disposal; do not scatter the material.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.

- Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.
- Fire involving Tanks; For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

## 6. Accidental release measures

### A. Personal precautions, protective equipment and emergency procedures

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Eliminate all ignition sources.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Cover with plastic sheet to prevent spreading.
- Prevent dust cloud.
- Please note that there are materials and conditions to avoid.

### B. Environmental precautions and protective procedures

- Avoid release to the environment.
- Prevent entry into waterways, sewers, basements or confined areas.

### C. The methods of purification and removal

- Collect spillage.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
- Powder Spill; Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.
- Small Spill; Take up with sand or other non-combustible absorbent material and place into containers for later disposal.

## 7. Handling and storage

### A. Precautions for safe handling

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash ... thoroughly after handling.
- Use only outdoors or in a well-ventilated area.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Use carefully in handling/storage.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.
- Be careful to high temperature.

### B. Conditions for safe storage

- Store in a well-ventilated place. Keep container tightly closed.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.

## 8. Exposure controls/personal protection

### A. Occupational Exposure limits

#### Korea regulation

Tetrahydro-2H-1,4-oxazine TWA = 20 ppm ( 70 mg/m<sup>3</sup> ), STEL = 30 ppm ( 105 mg/m<sup>3</sup> ) Skin

**Amino modified silicone** CAS No.69430-37-1;TWA:10mg/m<sup>3</sup>(실리콘)/CAS No.67-56-1;TWA:200ppm(260mg/m<sup>3</sup>)STEL:250ppm(310mg/m<sup>3</sup>)

**Preservatives**

( CAS No. 1310-73-2; Ceiling = 0.1 mg/m<sup>3</sup> )

**ACGIH regulation**

**Tetrahydro-2H-1,4-oxazine** TWA 20 ppm

**TRIETHANOLAMINE** TWA 5 mg/m<sup>3</sup>

**Amino modified silicone** CAS No. 67-56-1; TWA:200 ppm, STEL: 250 ppm

**Biological exposure index**

**Amino modified silicone** CAS No. 67-56-1; 15 mg/L

**OSHA regulation**

**Tetrahydro-2H-1,4-oxazine** TWA = 20 ppm (70 mg/m<sup>3</sup>)

**Amino modified silicone** CAS No. 67-56-1; TWA:200 ppm(260 mg/m<sup>3</sup>)

**Silicon dioxide** TWA = 20 mppcf (80 mg/m<sup>3</sup>/%SiO<sub>2</sub>)(Mineral Dusts)

**NIOSH regulation**

**Tetrahydro-2H-1,4-oxazine** STEL = 30 ppm (105 mg/m<sup>3</sup>), TWA = 20ppm(70 mg/m<sup>3</sup>)

**Amino modified silicone** CAS No. 67-56-1; TWA: 200 ppm(260 mg/m<sup>3</sup>), STEL: 250 ppm(325 mg/m<sup>3</sup>)

**Silicon dioxide** TWA = 6 mg/m<sup>3</sup>

**EU regulation** : Not available

**Other**

**Modified acrylic copolymer** the industry-recommended permissible exposure limit for respirablepolyacrylate dusts is 0.05 mg/m<sup>3</sup>.

**Tetrahydro-2H-1,4-oxazine** Australia : TWA = 20 ppm (71 mg/m<sup>3</sup>) Belgium : TWA = 10 ppm (36 mg/m<sup>3</sup>) Canada : TWA= 20 ppm(71 mg/m<sup>3</sup>) Denmark : TWA = 10 ppm (36 mg/m<sup>3</sup>) Colombia : TWA = 20 ppm

**TRIETHANOLAMINE** Belgium: TWA = 5 mg/m<sup>3</sup> Australia: TWA = 5 mg/m<sup>3</sup> Canada: TWA = 5 mg/m<sup>3</sup> Czech Republic: TWA = 5 mg/m<sup>3</sup>, Ceiling = 10 mg/m<sup>3</sup> Denmark: TWA = 0.5 ppm(3.1 mg/m<sup>3</sup>) Germany: MAK = 5 mg/m<sup>3</sup> (inhalable fraction)

**OLEIC ACID** Bulgaria : 10.0 mg/m<sup>3</sup>

**Polytetrafluoroethylene powder** Canada : TWA = 2.5 mg/m<sup>3</sup> Russia : TWA = 10 mg/m<sup>3</sup>(aerosol)

**Silicon dioxide** Australia: TWA = 2 mg/m<sup>3</sup> (respirable dust, listed under Fumed silica) Switzerland: TWA = 4 mg/m<sup>3</sup> (inhalable); 0.3 mg/m<sup>3</sup>(respirable) UK: TWA = 6 mg/m<sup>3</sup> (inhalable dust); 2.4 mg/m<sup>3</sup> (respirable dust), STEL = 18 mg/m<sup>3</sup> (calculated, inhalable dust); 7.2 mg/m<sup>3</sup> (calculated, respirable dust) Czech Republic: TWA = 0.1 mg/m<sup>3</sup> (respirable fraction); 4.0 mg/m<sup>3</sup> (as amorphous SiO<sub>2</sub>) Austria: TWA = 4 mg/m<sup>3</sup> (inhalable fraction); 0.3 mg/m<sup>3</sup> (respirable fraction)

**B. Appropriate engineering controls**

- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

**C. Personal protective equipment**

**Respiratory protection**

- Wear NIOSH or European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.
- In case exposed to gaseous/liquid material, the respiratory protective equipments as follow are recommended. escape full facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or escape half facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or direct full facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) half facepiece gas mask (of use for acid gas, in case of acid gas for organic compounds) or powered air-purifying gas mask.
- In lack of oxygen(< 19.5%), wear the supplied-air respirator or self-contained breathing apparatus.oxygen

**Eye protection**

- Wear enclosed safety goggles to protect from gaseous state organic material causing eye irritation or other disorder.
- An eye wash unit and safety shower station should be available nearby work place.

**Hand protection**

- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.
- Body protection**
- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

## 9. Physical and chemical properties

### A. Appearance

**Description** Liquid

**Color** opaque pale green

**B. Odor** solvent scent

**C. Odor threshold** Not available

**D. pH** 8.7 ~ 9.7

**E. Melting point/freezing point** Not available

**F. Initial boiling point and boiling range** Not available

**G. Flash point** Not available

**H. Evaporation rate** Not available

**I. Flammability (solid, gas)** Not applicable

**J. Upper/lower flammability or explosive limits** Not available

**K. Vapor pressure** Not available

**L. Solubility (ies)** Not available

**M. Vapor density** Not available

**N. Specific gravity** 1.0098 +/- 0.005

**O. Partition coefficient: n-octanol/water** Not available

**P. Auto ignition temperature** Not available

**Q. Decomposition temperature** Not available

**R. Viscosity** 1600 +/- 500 cP

**S. Molecular weight** Not available

## 10. Stability and reactivity

### A. Chemical stability and Possibility of hazardous reactions:

- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.
- Fire will produce irritating, corrosive and/or toxic gases.

### B. Conditions to avoid:

- Heat, sparks or flames

### C. Incompatible materials:

- Combustibles, reducing agents

### D. Hazardous decomposition products:

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning
- Corrosive and/or toxic fume
- Irritating and/or toxic gases

## 11. Toxicological information

### A. Information of Health Hazardous:

#### Acute toxicity

**Oral** [Not classified] (ATEmix = 58,686.67 mg/kg bw)

- **Tetrahydro-2H-1,4-oxazine** : Rat LD<sub>50</sub> = 1,900 mg/kg (OECD TG 401)
- **TRIETHANOLAMINE** : Rat LD<sub>50</sub> = 6,400 mg/kg (OECD TG 401)
- **Polysiloxane** : Rat LD<sub>50</sub> > 5,000 mg/kg
- **OLEIC ACID** : Rat LD<sub>50</sub> = 2,500 mg/kg

- **Antimony oxide calcium titanate** : Rat LD<sub>50</sub> > 2,000 mg/kg (암컷, OECD TG 425, GLP, read-across; CAS No. 1305-78-8)

- **Polytetrafluoroethylenepowder** : Rat LD<sub>50</sub> > 11,280 mg/kg

- **Silicon dioxide** : Rat LD<sub>50</sub> > 5,000 mg/kg (OECD TG 401, GLP)

**Dermal** [Not classified] (ATEmix = 29,653.85 mg/kg bw)

- **Modified acrylic copolymer** : LD<sub>50</sub> > 2,000 mg/kg

- **Tetrahydro-2H-1,4-oxazine** : Rabbit LD<sub>50</sub> = 500 mg/kg (male)(OECD TG 402)

- **TRIETHANOLAMINE** : Rabbit LD<sub>50</sub> > 2,000 mg/kg (OECD TG 402)

- **Polysiloxane** : Rabbit LD<sub>50</sub> > 10,000 mg/kg Acute toxicity is very low

- **OLEIC ACID** : Guinea pig LD<sub>50</sub> > 3,000 mg/kg

- **Antimony oxide calcium titanate** : Rabbit LD<sub>50</sub> > 2,500 mg/kg (OECD TG 402, read-across; CAS No. 7719-01-9)

- **Silicon dioxide** : Rabbit LD<sub>50</sub> > 5,000 mg/kg

**Inhalation** [Not classified] (ATEmix = 1,280.17 mg/L)

- **Tetrahydro-2H-1,4-oxazine** : Rat LC<sub>50</sub> = 22.16 mg/L/4hr (conversion: 18.1mg/L /6h)(OECD TG 403)

- **Polysiloxane** : Rat LC<sub>50</sub> > 535 mg/L Acute toxicity is very low

- **Antimony oxide calcium titanate** : Rat LC<sub>50</sub> > 3.5 mg/L/4hr (OECD TG 403, GLP, read-across ; CAS No. 1302-67-6)

- **Polytetrafluoroethylenepowder** : Rat LD<sub>50</sub> = mg/kg (Lung irritation)

- **Silicon dioxide** : Rat LC<sub>50</sub> > 2.08 mg/L/4hr (OECD TG 403, GLP)

**Skin corrosion/ irritation** [null]

- **Modified acrylic copolymer** : Not expected to be a primary skin irritant. Based on data from components or similar materials. Prolonged or repeated contact may cause dermatitis. Contact dermatitis may occur in sensitive individuals under extreme and unusual conditions of prolonged and repeated contact, such as high exposure accompanied by elevated temperature and occlusion by clothing. This effect may be the result of the product's hygroscopic properties, abrasion, or pH.

- **Tetrahydro-2H-1,4-oxazine** : The application of the test substance for 1 min caused in 1 animal haemorrhagic areas and leathery-like necrosis at the end of the observation period. The application for 5 min caused after 24 hours parchment-like necrosis in 1 animal and haemorrhagic areas after 24 hours and leathery-like necrosis after 8 days. The application of the test substance for 15 min caused haemorrhagic areas, oedema and parchment-like necrosis after 24 hours which declined to leathery-like necrosis after 8 days. (OECD TG 404, GLP)

- **TRIETHANOLAMINE** : In test on skin irritation with rabbits, skin irritations were not observed.(OECD TG 404)

- **Polysiloxane** : In test on skin irritation with rabbits, skin irritations were not observed.

- **OLEIC ACID** : Oleic acid were considered slightly to moderately irritating.

- **Polysiloxane** : Major irritation is not expected in a single, short-term exposure event.

- **Amino modified silicone** : May be harmful in contact with skin. May cause slight irritation.

Absorption through skin may cause damage to the following organs: retina, central nervous system (CNS).

- **C10-14 ISOALKANES** : C10-13 ISOALKANES : Skin irritations were observed.

- **Preservatives** : Skin corrosion or irritation substance.

- **Antimony oxide calcium titanate** : In test on skin irritation with rabbits, skin irritations were not observed.(OECD TG 431, GLP)

- **Polytetrafluoroethylene powder** : In skin irritation test with animal, skin irritations were not observed

- **Silicon dioxide** : In skin irritation test with rabbits, there were no symptoms of skin irritation(OECD TG 404, GLP).

**Serious eye damage/ irritation** [null]

- **Modified acrylic copolymer** : Moderate to strong eye irritant. Based on data from components or similar materials. Particulates may cause mechanical irritation. Solid particles(powder or dust) on the eye may cause pain and irritation.

- **Tetrahydro-2H-1,4-oxazine** : In eye irritation test with rabbit, all animals showed necrosis in and around the eyes. After an exposure time of 24 hours burns(corrosion) were observed. After the observation period eye injuries were observed in one animal. Corrosive effects in several animals

were observed.(OECD TG 405, GLP)(chemosis score : 1~2.3, cornea score : 1.3~1.6, iris score : 0~0.3 )

- **TRIETHANOLAMINE** : Recent animal studies indicate that TEA is only a 'slight' eye irritant and therefore this effect is not of concern.

-**Polysiloxane** : In test on eyes irritation with rabbits, eyes irritations were not observed.

- **OLEIC ACID** : Irritating to eyes.

-**Polysiloxane** : Direct contact may cause temporary redness and discomfort.

- **Amino modified silicone** : Direct contact may cause severe irritation.

- **C10-14 ISOALKANES** : - C10-13 ISOALKANES : eyes irritations were observed. - C10-14 ISOALKANES : Probability of MLD=0.007(TOPKAT 6.2)

- **Preservatives** : Serious eye damage or irritation substance.

- **Antimony oxide calcium titanate** : In test on eyes irritation with rabbits, eyes irritations were not observed. (OECD TG 405)

-**Polytetrafluoroethylenepowder** : Polymer non-toxic materials that are expected.

- **Silicon dioxide** : In eye irritation test with rabbits, there were no symptoms of eye irritation.(OECD TG 405, GLP)

#### **Respiratory sensitization** [Not classified]

- **Modified acrylic copolymer** : No data available to indicate product or components may be respiratory sensitizers.

-**Polytetrafluoroethylenepowder** : Applicants for the patch test results did not contain sensitive response characteristics.

#### **Skin sensitization** [Not classified]

- **Modified acrylic copolymer** : Not expected to cause skin sensitization. Based on data from components or similar materials.

- **Tetrahydro-2H-1,4-oxazine** : In skin sensitization test with guinea pigs, skin sensitization was not observed.

-**TRIETHANOLAMINE** : In Guinea pig maximisation test under OECD TG 406, triethanolamine is not a skin sensitizer in animals.(GLP)

-**Polysiloxane** : In skin sensitisation test with animals, skin sensitization were not observed.

-**Preservatives** : Skin sensitization substance.

- **Antimony oxide calcium titanate** : In test on skin sensitization mouse , skin sensitization were not observed.(OECD TG 429, GLP)

-**Polytetrafluoroethylene powder** : No reported human skin sensitization.

- **Silicon dioxide** : There is no evidence of skin sensitisation in workers over decades.

#### **Carcinogenicity** [Not classified]

##### **IARC**

- Tetrahydro-2H-1,4-oxazine : Group 3

- TRIETHANOLAMINE : Group 3

-Polytetrafluoroethylene powder : Group 3

- Silicon dioxide : Group 3

##### **ACGIH**

- Tetrahydro-2H-1,4-oxazine : A4

-Polytetrafluoroethylene powder : A4 Fluorides

**Tetrahydro-2H-1,4-oxazine** : There was no evidence of increased incidence of carcinogenesis due to chronic Morpholine inhalation. (OECD TG 453, GLP)

**TRIETHANOLAMINE** : There was no evidence of carcinogenicity by oral (up to 1000 mg/kg/day for 104 weeks, and up to 3334 mg/kg/day for 82 weeks amongst rats and mice respectively) or dermal routes (dose unknown) in studies of 14-18 months duration using rats and mice.

**Preservatives** : (1,2-Benzisothiazol-3(2H)-one): In acute toxicity test and structurally, carcinogenic hazards were not observed.

**Antimony oxide calcium titanate**: In test on carcinogenicity with guinea pigs, carcinogenicity was not observed.(OECD TG 413)



**Silicon dioxide** : In Carcinogenicity study, tumour incidence were not statistically significantly different from the controls.(OECD TG 453)

**Mutagenicity** [Not classified]

- **Modified acrylic copolymer** : No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
- **Tetrahydro-2H-1,4-oxazine** : Negative reactions were observed in vitro(unscheduled DNA synthesis(OECD TG 482), Sister Chromatid Exchange Assay in Mammalian Cells(OECD TG 479))and both negative and positive reactions were observed in vitro-Mammalian chromosome aberration test). Negative reaction was observed in in vivo-chromosome aberration assay and micronucleus test.
- **TRIETHANOLAMINE** : In vitro(bacterial reverse mutation assay, DNA damage and/or repair, chromosome aberration, mammalian cell gene mutation assay) : negative / In vivo genotoxicity is not anticipated.
- **Polysiloxane** : Ames test results negative
- **OLEIC ACID** : Negative reactions were observed in Ames test.
- **Antimony oxide calcium titanate** : Negative reactions were observed in, in vitro (Bacterial reverse mutation assay, OECD TG 471, GLP, read-across; CAS No. 1302-67-6, 1305-78-8; in vitro mammalian chromosome aberration test, read-across; CAS No. 1305-62-0; mammalian cell gene mutation assay, OECD TG 476, GLP, read-across; CAS No. 21645-51-2; Neutral comet assay(without metabolic activation), read-across; CD4+T cells). Positive reactions were observed in, in vitro(in vitro mammalian chromosome aberration test(without metabolic activation), OECD TG 473, read-across; CAS No. 7466-70-0; in vitro mammalian cell micronucleus test(without metabolic activation), OECD TG 487, read-across; Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>) and in vivo(female, Mammalian Erythrocyte Micronucleus Test(for the nano-sized materials (30 and 40 nm) with evidence of a dose-response relationship for MN), OECD TG, 474, read-across; 1344-28-1; female, chromosome aberration assay(for the nano-sized materials with evidence of a positive dose-response relationship for CAs), OECD TG 475, read-across; 1344-28-1).
- **Silicon dioxide** : Negative reactions were observed in both in vitro (Bacterial reverse mutation assay(OECD TG 471, GLP), Mammalian Chromosome Aberration Test(OECD TG 473, GLP)) and in vivo (mammalian cell gene mutation assay).

**Reproductive toxicity** [Not classified]

- **Modified acrylic copolymer** : No data available to indicate either product or components present at greater than 0.1% that cause reproductive toxicity.
- **Tetrahydro-2H-1,4-oxazine** : There were no substance-related spontaneous mortalities. liver cells and liver cell metabolism was observed, but It had no influence on gestation. specific skeletal variations mirror common minor effects on fetal morphology which are considered to be transient in nature. Thus it was regarded to be of no toxicological relevance (OECD TG 414, GLP, read-across ; Morpholine hydrochloride)
- **TRIETHANOLAMINE** : There was no evidence of developmental toxicity in the offspring of pregnant rats and mice (exposed during the major period of organogenesis to up to 30 mg/kg/day, and to 1125 mg/kg/day respectively using the oral route). There were no abnormalities noted in the histopathological examination of reproductive organs (testes and ovaries) in the 90-day oral and dermal toxicity studies.
- **Preservatives** : (1,2-Benzisothiazol-3(2H)-one): In an repeated dose toxicity study with animal, teratogenic or fetotoxic effects were not observed.
- **Antimony oxide calcium titanate** : In reproductive toxicity test(OECD TG 426 and 452, GLP, read-across; CAS No. 31142-56-0; OECD TG 422, GLP, read-across; 1327-41-9) and developmental toxicity test(OECD TG 414, read-across; CAS No. 1305-78-8; OECD TG 426 and 452, GLP, read-across; CAS No. 31142-56-0) with rats, there were no significant effects.
- **Polytetrafluoroethylenepowder** : According to the evidence of this substance is not Reproductive toxic to the animals.
- **Silicon dioxide** : No effects were observed in developmental toxicity and teratogenicity test with mouse(OECD TG 414).

**Specific target organ toxicity (single exposure)** [Category 3 (respiratory irritation)]

- **Modified acrylic copolymer** : - Oral Toxicity : LD50 is Based on data from components or similar materials. Swallowing material may cause irritation of the gastrointestinal lining, nausea, vomiting, diarrhea, and abdominal pain. - Inhalation Toxicity : Avoid inhalation of dust. Animal studies indicate the inhalation of respirable polyacrylate dust may cause inflammatory changes in

the lung. - **Respiratory Irritation** : May causes nose, throat, and lung irritation. Based on data from components or similar materials. Exposure to a dust may be irritating. Breathing of dust may cause coughing, mucous production, and shortness of breath.

- **Tetrahydro-2H-1,4-oxazine** : In acute oral toxicity test with rats, all animals were subjected to necropsy.(OECD TG 401, GLP)

- **TRIETHANOLAMINE** : In acute inhalation toxicity test with 12 rats, chronic bronchitis was observed in a rat, but no findings were observed in all other rats. (OECD TG 403)

- **Polysiloxane** : Inhalation : No significant effects are expected in a single, short-term exposure event. Ingestion : Low ingestion hazard in normal uses.

- **Amino modified silicone** : Inhalation: May be harmful if inhaled. Vapor / mist irritates the respiratory tract. Inhalation can cause damage to the following organs: retina, central nervous system. Excessive exposure to vapors may cause drowsiness. Ingestion: May be harmful if swallowed. Ingestion may damage the following organs: retina, central nervous system (CNS)

- **C10-14 ISOALKANES** : C10-13 ISOALKANES : Causes a respiratory tract irritation when inhaled.

- **Preservatives** : No information on significant side effects. Can induce irritation and allergic reactions.

- **Antimony oxide calcium titanate** : In acute inhalation toxicity with rats, slight respiratory distress effect was observed; all signs had resolved within 14days.(OECD TG 403)

- **Silicon dioxide** : In acute inhalation toxicity study with rats, restlessness and half-closed eyes were observed.(OECD TG 403, GLP)

#### **Specific target organ toxicity (repeat exposure) [Not classified]**

- **Modified acrylic copolymer** : A two-year inhalation study in rats exposed to a respirable, water-absorbent sodium polyacrylate dust resulted in lung effects such as inflammation, hyperplasia, and tumors. However, the inhalation of respirable dusts should be avoided by implementing respiratory protection measures and observing the recommended permissible exposure limit of 0.05 mg/m<sup>3</sup>.

- **Tetrahydro-2H-1,4-oxazine** : In toxic oral test with rat, no animal of the test group and of the control group died within the study period of 56 days. After 270 days had elapsed, the only symptom was moderate adiposis of the liver through an autopsy of them.

- **TRIETHANOLAMINE** : Mild skin irritations were observed following repeated exposures using the dermal route. Comparison of the NOAELs and LOAELs with anticipated exposure levels for humans in the occupational and consumer settings did not give cause for concern.

- **Polysiloxane** : Ingestion : If ingested repeatedly or drank large quantities, this may cause damage internally.

- **Amino modified silicone** : Skin: Over-exposure due to absorption may cause internal damage. Long-term repeated exposure may cause severe irritation. Inhalation: Prolonged or repeated exposure by inhalation may cause internal injuries. Ingestion: If ingested repeatedly or drink too much, internal damage may be induced.

- **Antimony oxide calcium titanate** : In an oral repeated dose toxicity study with rats during the postnatal period, clinical signs(mild alopecia and porphyrin staining, slight dehydration, diarrhoea) were observed.

- **Silicon dioxide** : In repeated-dose inhalation toxicity study with rats for 13 weeks, inflammatory responses in the respiratory tract and increased respiration rate were observed.(OECD TG 413, GLP)

#### **Aspiration Hazard [Not classified]**

- **Modified acrylic copolymer** : - Avoid inhalation of dust. Animal studies indicate the inhalation of respirable polyacrylate dust may cause inflammatory changes in the lung.

## **12. Ecological information**

### **A. Ecological toxicity**

- Acute toxicity : [Category 3] (ATEmix = 34.59453mg/ℓ)

- Chronic toxicity : [Category 2]

#### **Fish**

- **Modified acrylic copolymer** : LC<sub>50</sub> = 10 ~ 100 mg/L

- **Tetrahydro-2H-1,4-oxazine** : 96hr-LC<sub>50</sub> = 179 mg/L (Chelonengeli)

- **TRIETHANOLAMINE** : 96hr-LC<sub>50</sub> = 1180 mg/L

- **OLEIC ACID** : 96hr-LC<sub>50</sub> = 205 mg/L
- **Silicon dioxide** : 96hr-LC<sub>50</sub> = 5000 mg/L
- crustacean**
- **Modified acrylic copolymer** : EC<sub>50</sub> = 10 ~ 100 mg/L
- **Tetrahydro-2H-1,4-oxazine** : 48hr-EC<sub>50</sub> = 45 mg/L (OECD TG 202), 21d-NOEC (Daphnia magna) = 5 mg/L (OECD TG 211)
- **TRIETHANOLAMINE** : 24hr-LC<sub>50</sub> = 1386 mg/L
- **Silicon dioxide** : 48hr-EC<sub>50</sub> = 7600 mg/L
- Algae**
- **Tetrahydro-2H-1,4-oxazine** : 96hr-EC<sub>50</sub> (*Selenastrumcapricornutum*) = 28 mg/L
- **TRIETHANOLAMINE** : 72hr-LC<sub>50</sub> = 216 mg/L
- **Silicon dioxide** : 72hr-EC<sub>50</sub> = 440 mg/L ,72h-NOEC(*Selenastrumcapricornutum*)= 60 mg/L

## B. Persistence and degradability

### Persistence

- **Tetrahydro-2H-1,4-oxazine** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.56) (estimated)
- **TRIETHANOLAMINE** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -1.59)
- **OLEIC ACID** : High persistency (log Kow is more than 4 estimated.) (Log Kow = 7.64)
- **Polysiloxane** : Siloxanes are removed from the water by sludge flocculation or sedimentation.
- **Amino modified silicone** : Environmental migration : Siloxane is removed from water by sludge-flocculation or sedimentation.
- **C10-14 ISOALKANES** : C10-13 ISOALKANES : log Kow = 5.31(Estimated) / C10-14 ISOALKANES : log Kow = 5.18(Estimated)

### Degradability

- **TRIETHANOLAMINE** : Half-life in air - 4 hours, Half-life in soil - 14 days, Half-life in water - 14 days
- **Polysiloxane** : Siloxanes are decomposed in the soil.
- **Amino modified silicone** : Siloxane degrades in soil.
- **Preservatives** : (1,2-Benzisothiazol-3(2H)-one): In Bunch and Chabers Test, BIT(5 ppm) can be decomposed into two harmless metabolite by organisms. There are evidences of degradability(in soil) and photodecomposition(in water).

## C. Bioaccumulative potential

### Bioaccumulation

- **Modified acrylic copolymer** : Less than 1.0% of the components potentially bioconcentrate, based on octanol/water coefficients.
- **Tetrahydro-2H-1,4-oxazine** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF ≤ 0.65)
- **TRIETHANOLAMINE** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3)
- **OLEIC ACID** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 56.23) (estimated)
- **Polysiloxane** : No potential for bioaccumulation.
- **Amino modified silicone** : No potential for bioaccumulation.
- **C10-14 ISOALKANES** : C10-13 ISOALKANES : BCF = 2453 / C10-14 ISOALKANES : BCF = 1210(Potential to bioaccumulate.)
- **Preservatives** : (1,2-Benzisothiazol-3(2H)-one): Not likely to bioaccumulate.
- **Silicon dioxide** : Not bioaccumulating due to inherent substance properties.

### Biodegradation

- **Modified acrylic copolymer** : As not well-biodegraded, it is expected to have high accumulation potential in living organisms (= 25% biodegradation was observed after ) (OECD TG 301, 302)
- **Tetrahydro-2H-1,4-oxazine** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 95.2% biodegradation was observed after 28 days)
- **TRIETHANOLAMINE** : ready biodegradability (aerobic)
- **C10-14 ISOALKANES** : C10-14 ISOALKANES :No existing useful studies on the biodegradation. Bioaccumulation is expected to be high as it is non-biodegradable.
- **Antimony oxide calcium titanate** : This substance is not considered to be biodegradable.
- **Silicon dioxide** : Not applicable for inorganic substance.

## D. Mobility in soil

- **Tetrahydro-2H-1,4-oxazine** : Low potency of mobility to soil. (Koc = 0.2401)
- **TRIETHANOLAMINE** : Low potency of mobility to soil. (Koc = 3)
- **OLEIC ACID** : Low potency of mobility to soil. (Koc = 5.151)
- **C10-14 ISOALKANES** : C10-13 ISOALKANES : Koc = 1417 / C10-14 ISOALKANES : Koc = 31280

#### **E. Other hazardous effect**

- **Modified acrylic copolymer** : Physical and chemical Properties; Percent Volatile: **Polysiloxane** : Acute: No adverse effects on aquatic organisms. Chronic: No adverse effects on aquatic organisms. Effects at wastewater treatment plant : No adverse effects on bacteria.  $\geq 90\%$  is removed by sludge flocculation. Siloxanes in the product does not affect BOD. - **Amino modified silicone** : Acute: Very toxic to aquatic organisms. Chronic: Very toxic to aquatic life due to long-term effects. Impact on wastewater treatment plants: No adverse effects in bacteria are expected. Siloxane contained in this product does not affect the BOD.

### **13. Disposal considerations**

#### **A. Disposal method**

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

#### **B. Disposal precaution**

- Consider the required attentions in accordance with waste treatment management regulation.

### **14. Transport information**

#### **A. UN Number 3082**

**B. UN Proper shipping name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.**

#### **C. Transport Hazard class 9**

#### **D. Packing group III**

#### **E. Marine pollutant YES**

#### **F. Special precautions**

in case of fire F-A

in case of leakage S-F

### **15. Regulatory information**

#### **A. Occupational Safety and Health Regulation**

**Tetrahydro-2H-1,4-oxazine** : Occupational exposure limits listed

**Tetrahydro-2H-1,4-oxazine** : Occupational exposure limits listed

**Amino modified silicone** :Administration subject listed ; CAS No.67-56-1

**Amino modified silicone** :Work environment monitoring listed (6 months) ; CAS No. 67-56-1

**Amino modified silicone** :Health examination agent (12 months) ; CAS No. 67-56-1

**Amino modified silicone** :Occupational exposure limits listed ; CAS No. 67-56-1/ CAS No. 69430-37-1

**Preservatives** :Administration subject listed CAS No. 1310-73-2

**Preservatives** :Work environment monitoring listed (6 months); CAS No. 1310-73-2

**Preservatives** :Occupational exposure limits listed CAS No. 1310-73-2

#### **B. Toxic Chemical Control Act**

**Water** :Existing Chemical Substance (KE-35400)

**CARNAUBA WAX** :Existing Chemical Substance (KE-04879)

**Tetrahydro-2H-1,4-oxazine** : Existing Chemical Substance (KE-33492)

**TRIETHANOLAMINE** :Existing Chemical Substance KE-25940

**Polysiloxane** :Existing Chemical Substance (KE-31068)

**OLEIC ACID** :Existing Chemical Substance (KE-26450)

**Polysiloxane** :Existing Chemical Substance ; 3555-47-3 : KE-18602

**Amino modified silicone** :Existing Chemical Substance ; CAS No. 69430-37-1: KE-31129/CAS No. 67-56-1: KE-23193/CAS No. 556-67-2: KE-26606

**Amino modified silicone** :Accident Precaution Chemicals ; CAS No. 67-56-1

**Amino modified silicone** :Toxic Chemicals ; CAS No. 67-56-1(85% or more in mixtures)

**C10-14 ISOALKANES** :Existing Chemical Substance ; CAS No. 68551-17-7: KE-00531/CAS No. 68551-18-8: KE-00532

**Preservatives** :Existing Chemical Substance ; CAS No. 2634-33-5: KE-02680/CAS No. 57-55-6: KE-29267/CAS No. 1310-73-2: KE-31487/CAS NO. 7732-18-5: KE-35400

**Preservatives** :Toxic Chemicals ; CAS No. 1310-73-2: 97-1-136 (5% or more in mixtures)

**Antimony oxide calcium titanate** :Existing Chemical Substance (KE-05377)

**Polytetrafluoroethylenepowder** :Existing Chemical Substance (KE-33429)

**Silicon dioxide** :Existing Chemical Substance (KE-31032)

#### C. Dangerous Material Safety Management Regulation

**CARNAUBA WAX** :Dangerous Material Safety Management Regulation

**TRIETHANOLAMINE** :Dangerous Material Safety Management Regulation 4000 ℓ

**OLEIC ACID** :Dangerous Material Safety Management Regulation 4000ℓ

**Polyloxane** :Dangerous Material Safety Management Regulation

**Amino modified silicone** :Dangerous Material Safety Management Regulation CAS No. 67-56-1; Alcohols class 400ℓ / CAS No. 556-67-2; Petroleum class 4-2 (non-water soluble liquid) 1000ℓ

**Preservatives** :Dangerous Material Safety Management Regulation CAS No. 57-55-6; Petroleum class 4-3 (water soluble liquid) 4000ℓ/ CAS No. 1310-73-2; Non-dangerous goods

**Silicon dioxide** :Dangerous Material Safety Management Regulation

#### D. Wastes Control Act

**Amino modified silicone** :Wastes Control Act CAS No. 67-56-1; Controlled wastes

**Preservatives** :Wastes Control Act CAS No. 2634-33-5; Controlled wastes / CAS No. 1310-73-2; Controlled wastes

#### E. Other regulation (internal and external)

##### Internal information

**Persistent Organic Pollutants Acts** Not regulated

##### External information

##### EU classification(classification)

**Water** :Classification Not classified

**CARNAUBA WAX** :Classification Not classified

**Tetrahydro-2H-1,4-oxazine** : Classification R10, Xn; R20/21/22, C; R34

**OLEIC ACID** :Classification Not classified

**Preservatives** :Classification Xn; R22Xi;R38-41R43N;R50

**Antimony oxide calcium titanate** :Classification Not classified

**Silicon dioxide** :Classification Not classified

##### EU classification(risk phrases)

**Water** :Hazard statements Not applicable

**CARNAUBA WAX** :Hazard statements Not applicable

**Tetrahydro-2H-1,4-oxazine** : Hazard statements R10, R20/21/22, R34

**OLEIC ACID** :Hazard statements Not applicable

**Preservatives** :Hazard statements R22 R38 R41 R43 R50

**Antimony oxide calcium titanate** :Hazard statements Not applicable

**Silicon dioxide** :Hazard statements Not applicable

##### EU classification(safety phrases)

**Water** :Precautionary statements Not applicable

**CARNAUBA WAX** :Precautionary statements Not applicable

**Tetrahydro-2H-1,4-oxazine** : Precautionary statements S(1/2), S23, S36, S45

**OLEIC ACID** :Precautionary statements Not applicable

**Preservatives** :Precautionary statements S2 S24 S26 S37/39 S61

**Antimony oxide calcium titanate** :Precautionary statements Not applicable

**Silicon dioxide** :Precautionary statements Not applicable

**EU SVHC list** Not regulated

**EU Authorisation List** Not regulated

**EU Restriction list** Not regulated

##### U.S.A management information (OSHA Regulation)

**Preservatives** :OSHA1910 3001b

**U.S.A management information (CERCLA Regulation)** Not regulated  
**U.S.A management information (EPCRA 302 Regulation)** Not regulated  
**U.S.A management information (EPCRA 304 Regulation)** Not regulated  
**U.S.A management information (EPCRA 313 Regulation)**

**Preservatives :EPCRA 313 78lb**

**Substance of Roterdame Protocol** Not regulated  
**Substance of Stockholme Protocol** Not regulated  
**Substance of Montreal Protocol** Not regulated

#### **Foreign Inventory Status**

##### **Water**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
Japan management information Industrial Safety and Health Law Substances (ISHL): 2-(4)-1220  
China management information Inventory of Existing Chemical Substances (IECSC): Present 32224  
Canada management information Domestic Substances List (DSL): Present  
Australia management information Inventory of Chemical Substances (AICS): Present  
New Zealand management information Inventory of Chemicals (NZIoC): May be used as a single component chemical under an appropriate group standard.  
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

##### **Modified acrylic copolymer**

U.S.A management information Section 8(b) Inventory (TSCA): Present or exempt  
Japan management information Existing and New Chemical Substances (ENCS): Present  
China management information Inventory of Existing Chemical Substances (IECSC): Present  
Canada management information Domestic Substances List (DSL): Present  
Australia management information Inventory of Chemical Substances (AICS): Present  
New Zealand management information may require notification before sale under new zealand regulation.  
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present  
Bulk Quantity 85000 KG, 187391 Ibs  
Non-Bulk Quantity 207.8 KG, 458 Ibs

##### **Tetrahydro-2H-1,4-oxazine**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
Japan management information Existing and New Chemical Substances (ENCS): (5)-859  
China management information Inventory of Existing Chemical Substances (IECSC): Present 24854  
Canada management information Domestic Substances List (DSL): Present  
Australia management information Inventory of Chemical Substances (AICS): Present  
New Zealand management information Inventory of Chemicals (NZIoC): HSNO Approval: HSR001204  
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

##### **TRIETHANOLAMINE**

Australia management information Inventory of Chemical Substances (AICS): Present  
Canada management information Domestic Substances List (DSL): Present  
China management information Inventory of Existing Chemical Substances (IECSC): Present 29507  
Japan management information Existing and New Chemical Substances (ENCS): (2)-308  
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present  
U.S.A management information Section 8(b) Inventory (TSCA): Present  
New Zealand management information Inventory of Chemicals (NZIoC): HSNO Approval: HSR002785

##### **Polysiloxane**

U.S.A management information Section 8(b) Inventory (TSCA): Present [XU]  
Japan management information Existing and New Chemical Substances (ENCS): (7)-476  
China management information Inventory of Existing Chemical Substances (IECSC): Present 08512  
Canada management information Domestic Substances List (DSL): Present  
Australia management information Inventory of Chemical Substances (AICS): Present  
New Zealand management information Inventory of Chemicals (NZIoC): Inventory of Chemicals (NZIoC): HSNO Approval: HSR003036  
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

##### **OLEIC ACID**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
Japan management information Existing and New Chemical Substances (ENCS): (2)-975; (2)-609  
China management information Inventory of Existing Chemical Substances (IECSC): Present  
Canada management information Domestic Substances List (DSL): Present  
Australia management information Inventory of Chemical Substances (AICS): Present

New Zealand management information Inventory of Chemicals (NZIoC): HSNO Approval: HSR003153  
 Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

#### **Polysiloxane**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
 Japan management information Existing and New Chemical Substances (ENCS): Present  
 China management information Inventory of Existing Chemical Substances (IECSC): Present  
 Canada management information Domestic Substances List (DSL): Present  
 Australia management information Inventory of Chemical Substances (AICS): Present  
 New Zealand management information Inventory of Chemicals (NZIoC): HSNO Approval: Present  
 Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

#### **Amino modified silicone**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
 Japan management information Existing and New Chemical Substances (ENCS): Present  
 China management information Inventory of Existing Chemical Substances (IECSC): Present  
 Canada management information Domestic Substances List (DSL): Present  
 Australia management information Inventory of Chemical Substances (AICS): Present  
 New Zealand management information Inventory of Chemicals (NZIoC): HSNO Approval: Present  
 Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

#### **Antimony oxide calcium titanate**

#### **Polytetrafluoroethylene powder**

U.S.A management information Section 8(b) Inventory (TSCA): Present [XU]  
 Japan management information Existing and New Chemical Substances (ENCS): (6)-939  
 China management information Inventory of Existing Chemical Substances (IECSC): Present 21488  
 Canada management information Domestic Substances List (DSL): Present  
 Australia management information Inventory of Chemical Substances (AICS): Present  
 New Zealand management information Inventory of Chemicals (NZIoC): May be used as a single component chemical under an appropriate group standard.  
 Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

#### **Silicon dioxide**

U.S.A management information Section 8(b) Inventory (TSCA): Present  
 Japan management information Existing and New Chemical Substances (ENCS): (1)-548  
 China management information Inventory of Existing Chemical Substances (IECSC): Present 11361  
 Canada management information Domestic Substances List (DSL): Present  
 Australia management information Inventory of Chemical Substances (AICS): Present  
 New Zealand management information Inventory of Chemicals (NZIoC): May be used as a single component chemical under an appropriate group standard.  
 Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

## **16. Other information**

### **A. Information source and references**

TOMES-LOLI@; <http://www.rightanswerknowledge.com/loginRA.asp>  
 AKRON; <http://ull.chemistry.uakron.edu/erd> (Description) , (Color) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Vapor pressure) , (Vapor density) , (Specific gravity) , (Viscosity) , (Molecular weight)  
 American Conference of Governmental Industrial Hygienists TLVs and BEIs.  
 EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>  
 IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>  
 Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
 NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>  
 National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
 National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>  
 National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
 TOMES-LOLI@; <http://www.rightanswerknowledge.com/loginRA.asp>  
 Waste Control Act enforcement regulation attached [1]  
 Korea Occupational Health & Safety Agency; <http://www.kosha.net>

Lubrizol MSDS (Other) , (Description) , (Color) , (Odor) , (pH) , (Upper/lower flammability or explosive limits) , (Solubility (ies)) , (Vapor density) , (Specific gravity) , (Auto ignition temperature) , (Dermal) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Respiratory sensitization) , (Skin sensitization) , (Mutagenicity) , (Reproductive toxicity) , (Specific target organ toxicity (single exposure)) , (Specific target organ toxicity (repeat exposure)) , (Aspiration Hazard) , (Fish) , (crustacean) , (Bioaccumulation) , (Biodegradation) , (Other hazardous effect)

National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>

National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>

Waste Control Act enforcement regulation attached [1]

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>

Korea Occupational Health & Safety Agency; <http://www.kosha.net>

NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>

National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>

National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>

National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)

The Chemical Database -The Department of Chemistry at the University of Akron; <http://ull.chemistry.uakron.edu/erd/> (Color) , (Odor) , (Melting point/freezing point) , (Flash point) , (Solubility (ies)) , (Specific gravity)

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

Waste Control Act enforcement regulation attached [1]

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>

Emergency Response Guidebook 2008; [http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008\\_eng.pdf](http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008_eng.pdf)

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>

Korea Occupational Health & Safety Agency; <http://www.kosha.net>

NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>

National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>

National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>

National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)

REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Color) , (Odor) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Flash point) , (Vapor pressure) , (Solubility (ies)) , (Specific gravity) , (Partition coefficient: n-octanol/water) , (Auto ignition temperature) , (Viscosity) , (Molecular weight) , (Oral) , (Dermal) , (Inhalation) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Skin sensitization) , (Mutagenicity) , (Reproductive toxicity) , (Specific target organ toxicity (single exposure)) , (Specific target organ toxicity (repeat exposure)) , (Fish) , (crustacean) , (Algae) , (Mobility in soil)

REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Bioaccumulation)

TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>

The Chemical Database -The Department of Chemistry at the University of Akron; <http://ull.chemistry.uakron.edu/erd/> (Odor threshold) , (Flammability (solid, gas)) , (Upper/lower flammability or explosive limits) , (Vapor density)

U.S. National library of Medicine(NLM) Hazardous Substances Data Bank(HSDB); <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> (pH) , (Decomposition temperature)

UN Recommendations on the transport of dangerous goods 17th

Waste Control Act enforcement regulation attached [1]

<http://apps.echa.europa.eu/registered/registered-sub.aspx> (Biodegradation)

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>

Korea Occupational Health & Safety Agency; <http://www.kosha.net>

NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>



National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
OECD SIDS; <http://webnet.oecd.org/hpv/ui/Search.aspx> (Serious eye damage/ irritation) ,  
(Carcinogenicity) , (Reproductive toxicity) , (Specific target organ toxicity (repeat exposure)) , (Fish) ,  
(crustacean) , (Algae) , (Persistence) , (Degradability) , (Mobility in soil)  
REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Description) , (Color) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Flash point) , (Flammability (solid, gas)) , (Vapor pressure) , (Solubility (ies)) , (Specific gravity) , (Partition coefficient: n-octanol/water) , (Auto ignition temperature) , (Viscosity) , (Molecular weight) , (Oral) , (Dermal) , (Skin corrosion/ irritation) , (Skin sensitization) , (Mutagenicity) , (Specific target organ toxicity (single exposure)) , (Biodegradation)  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp> (Other)  
The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/> (Upper/lower flammability or explosive limits)  
U.S. National library of Medicine(NLM) Hazardous Substances Data Bank(HSDB);  
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> (Odor) , (pH) , (Vapor density) , (Bioaccumulation)  
Waste Control Act enforcement regulation attached [1]  
American Conference of Governmental Industrial Hygienists TLVs and BEIs.  
EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>  
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
Momentive Performance materials MSDS (Initial boiling point and boiling range) , (Vapor pressure) , (Solubility (ies)) , (Vapor density)  
Momentive Performance materials MSDS (Odor) , (Oral) , (Dermal) , (Inhalation) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Skin sensitization) , (Mutagenicity)  
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>  
The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/> (Description) , (Color) , (Melting point/freezing point) , (Flash point) , (Specific gravity) , (Auto ignition temperature) , (Decomposition temperature)  
Waste Control Act enforcement regulation attached [1]  
American Conference of Governmental Industrial Hygienists TLVs and BEIs.  
ECOTOX; <http://cfpub.epa.gov/ecotox/> (Fish)  
EPISUITE v4.1; <http://www.epa.gov/opt/exposure/pubs/episuitedl.htm> (Bioaccumulation) , (Mobility in soil)  
EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>  
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>  
The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/> (Flash point) , (Upper/lower flammability or explosive limits) , (Vapor density) , (Auto ignition temperature)  
U.S. National library of Medicine(NLM) ChemIDplus; <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CHEM> (Oral)  
U.S. National library of Medicine(NLM) Chemical Carcinogenesis Research Information System(CCRIS); <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS> (Mutagenicity)

U.S. National library of Medicine(NLM) Hazardous Substances Data Bank(HSDB);  
<http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB> (Description) , (Color) , (Odor) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Vapor pressure) , (Solubility (ies)) , (Specific gravity) , (Partition coefficient: n-octanol/water) , (Viscosity) , (Molecular weight) , (Dermal) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Persistence)  
Waste Control Act enforcement regulation attached [1]  
DOW CORNING MSDS (Description) , (Color) , (Odor) , (Initial boiling point and boiling range) , (Flash point) , (Flammability (solid, gas)) , (Specific gravity) , (Viscosity) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Specific target organ toxicity (single exposure)) , (Specific target organ toxicity (repeat exposure)) , (Persistence) , (Degradability) , (Bioaccumulation) , (Other hazardous effect)  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>  
Waste Control Act enforcement regulation attached [1]  
DOW CORNING MSDS (Description) , (Color) , (Initial boiling point and boiling range) , (Flash point) , (Flammability (solid, gas)) , (Specific gravity) , (Viscosity) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Specific target organ toxicity (single exposure)) , (Specific target organ toxicity (repeat exposure)) , (Persistence) , (Degradability) , (Bioaccumulation) , (Other hazardous effect)  
Emergency Response Guidebook 2008;  
[http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008\\_eng.pdf](http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008_eng.pdf)  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>  
UN Recommendations on the transport of dangerous goods 17th  
Waste Control Act enforcement regulation attached [1]  
EPISUITE v4.1; <http://www.epa.gov/opt/exposure/pubs/episuitedl.htm>  
Ecological Structure Activity Relationships  
KOREX MSDS (Description) , (Color) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Flash point) , (Evaporation rate) , (Upper/lower flammability or explosive limits) , (Vapor pressure) , (Vapor density) , (Specific gravity) , (Auto ignition temperature) , (Viscosity) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Specific target organ toxicity (single exposure)) , (Persistence) , (Bioaccumulation) , (Biodegradation) , (Mobility in soil)  
KOSHANET  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system; <http://www.nema.go.kr/hazmat/main/main.jsp>  
Quantitative Structure Activity Relation  
Seton compliance resource center  
TOPKAT 6.2  
U.S. National library of Medicine(NLM) ChemIDplus; <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CHEM>  
Waste Control Act enforcement regulation attached [1]  
CDI MSDS (Description) , (Color) , (Odor) , (pH) , (Melting point/freezing point) , (Specific gravity) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Skin sensitization) , (Carcinogenicity) , (Reproductive toxicity) , (Specific target organ toxicity (single exposure)) , (Degradability) , (Bioaccumulation)  
Corporate Solution From Thomson Micromedex; <http://csi.micromedex.com>  
ECOTOX; <http://cfpub.epa.gov/ecotox/>  
European Union Risk Assessment Report (RAR); <http://esis.jrc.ec.europa.eu/>  
Handbook of Industrial Poisoning.Korea :Sinkwang  
International Programme on Chemical Safety(IPCS) International Chemical Safety Cards (ICSCs); <http://www.inchem.org/>  
International Uniform Chemical Information Database(IUCLID); <http://esis.jrc.ec.europa.eu/>  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>

National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/>  
U.S. National library of Medicine(NLM); <http://toxnet.nlm.nih.gov>  
Waste Control Act enforcement regulation attached [1]  
International Uniform Chemical Information Database(IUCLID); <http://esis.jrc.ec.europa.eu/> (Initial boiling point and boiling range) , (Solubility (ies)) , (Specific gravity) , (Molecular weight)  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Color) , (Odor) , (Melting point/freezing point) , (Oral) , (Dermal) , (Inhalation) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Skin sensitization) , (Carcinogenicity) , (Mutagenicity) , (Reproductive toxicity) , (Specific target organ toxicity (single exposure)) , (Specific target organ toxicity (repeat exposure))  
Waste Control Act enforcement regulation attached [1]  
American Conference of Governmental Industrial Hygienists TLVs and BEIs.  
DUPONT MSDS (Description) , (Color) , (Initial boiling point and boiling range) , (Solubility (ies)) , (Auto ignition temperature) , (Oral) , (Inhalation) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Respiratory sensitization) , (Skin sensitization) , (Reproductive toxicity)  
EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>  
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp> (Other)  
The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/> (Melting point/freezing point) , (Specific gravity) , (Decomposition temperature) , (Molecular weight)  
Waste Control Act enforcement regulation attached [1]  
American Conference of Governmental Industrial Hygienists TLVs and BEIs.  
EU CLP; <http://esis.jrc.ec.europa.eu/index.php?PGM=cla>  
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>  
International Uniform Chemical Information Database(IUCLID); <http://esis.jrc.ec.europa.eu/> (Specific target organ toxicity (repeat exposure)) , (Fish) , (crustacean) , (Algae)  
Korea Occupational Health & Safety Agency; <http://www.kosha.net>  
NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>  
National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>  
National Emergency Management Agency-Korea dangerous material inventory management system;  
<http://www.nema.go.kr/hazmat/main/main.jsp>  
National Toxicology Program; [http://ntp-apps.niehs.nih.gov/ntp\\_tox/index.cfm](http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm)  
OECD SIDS; <http://webnet.oecd.org/hpv/ui/Search.aspx> (Dermal) , (Serious eye damage/ irritation) , (Skin sensitization) , (Bioaccumulation) , (Biodegradation)  
REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Color) , (Odor) , (pH) , (Melting point/freezing point) , (Initial boiling point and boiling range) , (Vapor pressure) , (Solubility (ies)) , (Specific gravity) , (Oral) , (Dermal) , (Inhalation) , (Skin corrosion/ irritation) , (Serious eye damage/ irritation) , (Mutagenicity) , (Reproductive toxicity) , (Specific target organ toxicity (single exposure))  
REACH information on registered substances; <http://apps.echa.europa.eu/registered/registered-sub.aspx> (Carcinogenicity)  
TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp> (Mobility in soil)

The Chemical Database -The Department of Chemistry at the University of Akron;  
<http://ull.chemistry.uakron.edu/erd/> (Molecular weight)  
Waste Control Act enforcement regulation attached [1]

**B. Issuing date** Nov 07, 2013

**C. Revision number and date**

**revision number 1**

**date of the latest revision 2014.07.16**

**D. Others**

- Revised Material Safety Data Sheet based on the amendments made on the Ministry of Employment and Labor Public Notice on Standard for Classification Labeling of Chemical Substance and Material Safety Data Sheet.
- This MSDS is authored in pursuant to the Article 41 of the Occupational Safety and Health Act.
- The content is based on the latest information and knowledge that we currently possess.
- This MSDS was authored to aid buyer, processor or any other third person who handles the chemical of subject in the MSDS; additionally, it does not warrant suitability of the chemical for special purposes or the commercial use of statements that approves the use of it in combination with other chemicals as well as technical or legal liabilities.