# MATERIAL SAFETY DATA SHEET

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

**A. GHS product identifier** FIRSTCLASS TIRE CLEAN & SHINE
**B. Recommended use of the chemical and restrictions on use**
**Recommended use** Tire cleaner & shine
**Restrictions on use** Use only as intended
**C. Manufacturers**
**Company name** BULLSONE
**Address** 7F, Dabong Tower, 418, Teheran-ro Gangnam-gu, Seoul, 135-839, Korea
**Emergency phone number** 82-2-2106-7777
**Respondent** Han Dong Jin
**Fax** 82-32-8749952

## 2. Hazards identification

**A. GHS classification of the substance/mixture**
Gases under pressure : Liquefied gas
Hazardous to the aquatic environment (acute hazard) : Category 2
**B. GHS label elements, including precautionary statements**
**Pictogram and symbol :**

**Signal word :** Warning
**Hazard statements :**
H280 Contains gas under pressure; may explode if heated.
H401 Toxic to aquatic life.
**Precautionary statements**
**Precaution**
P273 Avoid release to the environment.
**Treatment** : Not applicable
**Storage**
P410+P403 Protect from sunlight. Store in a well-ventilated place.
**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** 0
**Flammability** 1
**Reactivity** Not available

## 3. Composition/information on ingredients

| Chemical Name | Common Name(Synonyms) | CAS number | EC number | Content (%) |
|---|---|---|---|---|
| Water | Dihydrogen oxide | 7732-18-5 | 231-791-2 | 60~70% |
| Silicone emulsion | | | | 20~30% |
| Poyethylene glycol lauryl ether | Poyethylene glycol | 9002-92-0 | 500-002-6 | 1~5% |

| | | | | |
|---|---|---|---|---|
| | lauryl ether<br>DODECYL ALCOHOL, ETHOXYLATED | | | |
| GLYCEROL | Glycerine<br>Glycerin<br>Glycyl alcohol<br>Glyceritol<br>Trihydroxypropane | 56-81-5 | 200-289-5 | 1~5% |
| Sodium Benzoate | Benznatron<br>Benzoic acid, Sodium salt<br>Natriumbenzoat | 532-32-1 | 208-534-8 | 1~5% |
| Butane | Butan<br>Butano<br>n-Butan<br>xutane pure | 106-97-8 | 203-448-7 | 5~10% |

## 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 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.

**C. Inhalation**
- Move victim to fresh air.
- 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**
- Contains gas under pressure; may explode if heated.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Fire will produce irritating, corrosive and/or toxic gases.
- Some of these materials, if spilled, may leave a flammable residue after evaporation

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

- Evacuate area and fight fire from a safe distance.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Ruptured cylinders may rocket.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Do not direct water at source of leak or safety devices; icing may occur.
- 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.
- Damaged cylinders should be handled only by specialists.
- Use extinguishing agent suitable for type of surrounding fire.

## 6. Accidental release measures

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

- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent dust cloud.
- Please note that there are materials and conditions to avoid.

**B. Environmental precautions and protective procedures**

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

**C. The methods of purification and removal**

- 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**

- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.

**B. Conditions for safe storage**

- Protect from sunlight. Store in a well-ventilated place.
- Containers can build up pressure if exposed to heat (fire).

## 8. Exposure controls/personal protection

**A. Occupational Exposure limits**

**Korea regulation**

**GLYCEROL** TWA = 10 mg/m³

**ACGIH regulation**

**GLYCEROL** TWA 10 mg/m³ (mist)

**Butane** STEL 1000 ppm

**Biological exposure index** : Not available

**OSHA regulation**

**GLYCEROL** TWA = 15 mg/m³(mist, total particulate), 5 mg/m³(mist, respirable fraction)
**Butane** TWA = 800 ppm, (1900 mg/m³)

**NIOSH regulation**

**GLYCEROL** TWA = 10 mg/m³ (mist, as an 8-hour TWA)
**Butane** TWA = 800 ppm, (1900 mg/m³)

**EU regulation** : Not available

**Other**

**GLYCEROL** Australia : TWA=10 mg/m³ Canada : TWA=10 mg/m³ France : TWA=10 mg/m³ Germany : TWA=100 mg/m³ Greece : TWA=10 mg/m³
**Butane** Germany : TWA=1000ppm(2400 mg/m³) Greece : TWA=1000ppm(2350 mg/m³) Hong Kong : TWA=800ppm(1900 mg/m³)

**B. Appropriate engineering controls**

**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** Hazy
**B. Odor** Odorless
**C. Odor threshold** Not available
**D. pH** 7 ~ 8
**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** 1.0
**O. Partition coefficient: n-octanol/water** Not available
**P. Auto ignition temperature** Not available
**Q. Decomposition temperature** Not available
**R. Viscosity** Not available
**S. Molecular weight** Not available

## 10. Stability and reactivity

**A. Chemical stability and Possibility of hazardous reactions:**
- Contains gas under pressure; may explode if heated.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Fire will produce irritating, corrosive and/or toxic gases.

**B. Conditions to avoid:**
- Heat

**C. Incompatible materials:**

**D. Hazardous decomposition products:**
- Irritating, corrosive and/or toxic gases

## 11. Toxicological information

**A. Information of Health Hazardous:**

**Acute toxicity**

**Oral** [Not classified] (ATEmix = 60,070.52 mg/kg bw)

- **Poyethylene glycol lauryl ether** : Rat $LD_{50}$ = 1,000 mg/kg (female)
- **GLYCEROL** : Rat $LD_{50}$ = 27,200 mg/kg (female)
- **Sodium Benzoate** : Rat $LD_{50}$ = 2,100 mg/kg

**Dermal** [Not classified] (ATEmix = 130,983.83 mg/kg bw)

- **Poyethylene glycol lauryl ether** : Rat $LD_{50}$ = 2,000 mg/kg (OECD TG 402)
- **GLYCEROL** : Guinea pig $LD_{50}$ = 56,750 mg/kg

**Inhalation** [Not classified] (ATEmix = 11,082.24 mg/L)

- **GLYCEROL** : Rat $LC_{50}$ > 2.75 mg/L/4hr (male)
- **Butane** : Rat $LC_{50}$ = 1,443 mg/L/15min

**Skin corrosion/ irritation** [Not classified]

- **Silicone emulsion** : No significant irritation in single, short-term exposure event.
- **Poyethylene glycol lauryl ether** : By administration of Dodecan-1-ol,ethoxylated at dose concentration of 75 mg for 24 hrs showed mild irritation to skin of rabbits by Standard draize test.
- **GLYCEROL** : In test on skin irritation with rabbits, skin irritations were not observed.
- **Sodium Benzoate** : In skin irritation test with rabbits, skin irritations were not observed.(OECD TG 404, GLP)

**Serious eye damage/ irritation** [Not available]

- **Silicone emulsion** : Eye : Direct contact can induce slight irritation.
- **Poyethylene glycol lauryl ether** : By the Standard draize test administration of Dodecan-1-ol,ethoxylated in the dose of 100 mg was reported to be irritating to eye of rabbit.
- **GLYCEROL** : In test on eyes irritation with rabbits, eyes irritations were not observed.
- **Sodium Benzoate** : In eye irritation test with rabbits, eye irritations were observed.(Draize=7.7, cornea=0, iris=0, conjunctivae=2.7, chemosis=0.7)(female)(OECD TG 405, GLP)

**Respiratory sensitization** [Not classified]

- **Silicone emulsion** : Irritating to respiratory system weaken

**Skin sensitization** [Not classified]

- **Poyethylene glycol lauryl ether** : Administartion of the test substance Dodecan-1-ol, ethoxylated for 24 hrs. in adult male guinea pigs when injected intracutaneously did not produced direct or delayed sensitization reactions.

**Carcinogenicity** [Not classified]

KOREA-ISHL, IARC, NTP, OSHA, ACGIH, EU Regulation 1272/2008: not listed

**GLYCEROL** : In carcinogenicity test with rat, the result gave no evidence of a cancerogenic potential in rat.

**Mutagenicity** [Not classified]

- **Poyethylene glycol lauryl ether** : Negative reactions were observed in vitro test(mammalian chromosome aberration test and bacterial reverse mutation assay).

- **GLYCEROL** : Negative reactions were observed in in vitro test(Chromosomal aberrations test(OECD TG 473), unscheduled DNA synthesis test(OECD TG 482), Ames test(OECD TG 471, GLP)).
- **Sodium Benzoate** : Positive reaction was observed in vitro(mammalian chromosome aberration test(OECD TG 473, GLP))/ Negitive reactions were observed in vitro(bacterial reverse mutation assay(OECD TG 471, GLP)) and in vivo(Mutagenicity Screening Studies).
- **Butane** : Negative reactions were observed with and without metabolic activation in vitro(mammalian chromosome aberration test(OECD TG 473, GLP), bacterial reverse mutation assay(OECD TG 471, GLP).

**Reproductive toxicity** [Not classified]

- **Poyethylene glycol lauryl ether** : Human(female) was treated by endoscopic intravasal injection sclerotherapy using polidocanol. No adverse effects were detected in the newborn.
- **GLYCEROL** : In reproductive/developmental oral toxicity study, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses.(NOAEL =8000-10000 mg/kg bw)
- **Sodium Benzoate** : In developmental toxicity screening test with rabbits, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses.(NOAEL ≥ 250 mg/kg bw/day)(OECD TG 414).
- **Butane** : In reproduction/developmental toxicity screening test, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses.(NOAEC=21641 mg/m³)(OECD TG 422, GLP)

**Specific target organ toxicity (single exposure)** [null] [null]

- **Silicone emulsion** : Low hazard to common use.
- **Poyethylene glycol lauryl ether** : No deaths or signs of toxicity were observed.(OECD TG 402)
- **GLYCEROL** : In acute oral toxicity test with rats, Muscle spasms and clonic convulsions were observed.
- **Sodium Benzoate** : In acute oral toxicity test with rats, acute toxic effects were not observed.

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

- **Silicone emulsion** : Ingestion : Can induce internal damages if repeatedly ingested or drank to much. Skin : Can induce skin irritations in repeat, long-term exposure event. Inhalation : No data
- **Poyethylene glycol lauryl ether** : The average systolic blood pressure of rats medicated at the top dose level was not significantly different from that of the controls 2 hours after the last medication. No gross or microscopic pathologic lesions attributable to medication were noted at autopsy.
- **GLYCEROL** : In repeated oral toxicity test with rats, In the male rats was an increase in the final liver/body weight ratio and upon microscopic examination generalized cloudy swelling and hypertrophy of the parenchymal cells was observed. The only effect in the female rats on this level was some generalized cloudy selling upon microscopic examination of the liver.
- **Sodium Benzoate** : One high dose male died, after hypersensitivity and convulsions. No further clinical signs were reported.Mean body weights of male and female high dose animals were depressed and Changes in organ weights were noted in the mid and high dose groups.(NOAEL=18100 mg/kg)(OECD TG 407)
- **Butane** : In repeated inhalation toxicity study with rats for 28 days, repeated toxicity related effects were not observed.(NOAEC = 9,000 ppm)(OECD TG 422, GLP)

**Aspiration Hazard** [Not classified]

## 12. Ecological information

**A. Ecological toxicity**

- Acute toxicity : [Category 2] (ATEmix = 3.29991mg/ℓ)
- Chronic toxicity : [Not classified]

**Fish**

- **Poyethylene glycol lauryl ether :** 96hr-$LC_{50}$ (other) = 1.5 mg/L (Salmo salar)
- **GLYCEROL :** 96hr-$LC_{50}$ = 54000 mg/L
- **Sodium Benzoate :** 96hr-$LC_{50}$ > 100 mg/L (pH 6.5 ~ 8.5)(OECD TG 203)

**crustacean**

- **Poyethylene glycol lauryl ether :** 48hr-$LC_{50}$ (*Daphnia magna*) = 4.780 ~ 7.580 mg/L
- **GLYCEROL :** 48hr-$EC_{50}$ = 1955 mg/L
- **Sodium Benzoate :** 96hr-$LC_{50}$ > 100 mg/L (OECD TG 202)

**Algae**

- **Sodium Benzoate :** 72hr-$EC_{50}$ (other) > 30.5 mg/L NOEC-72hr (Pseudokirchnerella subcapitata)=0.09 mg/L), (pH 8.0 ~ 8.5, 23.1 ~ 23.4 ℃)(OECD TG 201, GLP)

**B. Persistence and degradability**

**Persistence**

- **Silicone emulsion** : Siloxanes are removed from water by sludge-flocculation or sedimentation.
- **Poyethylene glycol lauryl ether** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 1.937) (23 ℃)
- **GLYCEROL** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -1.75) (25 °C)(OECD TG 107)
- **Sodium Benzoate** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -2.27)

**Degradability**

- **Silicone emulsion** : We are ready to provide additional environment information on Silicone constituents.

**C. Bioaccumulative potential**

**Bioaccumulation**

- **Silicone emulsion** : Not likely to bioaccumulate.
- **Poyethylene glycol lauryl ether** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 120) (estimated)
- **GLYCEROL** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (Estimated)
- **Sodium Benzoate** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162)

**Biodegradation**

- **Poyethylene glycol lauryl ether** : This substance is ready biodegradabililty.
- **GLYCEROL** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 60% biodegradation was observed after 2 hrs)
- **Sodium Benzoate** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (≥ 74% biodegradation was observed after 28 days) (OECD TG 301 B)
- **Butane** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 100% biodegradation was observed after 385 hrs)

**D. Mobility in soil**

- **Silicone emulsion** : Siloxanes decomposed in the soil.
- **Poyethylene glycol lauryl ether** : Low potency of mobility to soil. (Koc = 87.36)
- **GLYCEROL** : Low potency of mobility to soil. (Koc = 0.1345) (estimated)
- **Sodium Benzoate** : Low potency of mobility to soil. (Koc = 0.07945)

**E. Other hazardous effect**

- **Silicone emulsion** : Environmental impact: No adverse effects on aquatic organisms. / Impact on wastewater treatment plant : Over 90% Siloxanes are removed by sludge-flocculation. No adverse effects on bateria. This product including Siloxane does not effct on 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** 1950
**B. UN Proper shipping name** AEROSOLS
**C. Transport Hazard class** 2

**D. Packing group**
**E. Marine pollutant** No
**F. Special precautions**
**in case of fire** F-D
**in case of leakage** S-U

## 15. Regulatory information

**A. Occupational Safety and Health Regulation**
**GLYCEROL :** Occupational exposure limits listed
**Butane :** Occupational exposure limits listed
**B. Toxic Chemical Control Act**
**Water :** Existing Chemical Substance (KE-35400)
**Silicone emulsion :** Existing Chemical Substance ; CAS No. 63148-62-9: KE-31068/ CAS No. 7732-18-5: KE-35400/ CAS No. 68131-39-5: KE-13388
**Poyethylene glycol lauryl ether :** Existing Chemical Substance (KE-12935)
**GLYCEROL :** Existing Chemical Substance (KE-29297)
**Sodium Benzoate :** Existing Chemical Substance KE-02711
**C. Dangerous Material Safety Management Regulation**
**GLYCEROL :** Dangerous Material Safety Management Regulation 4000ℓ
**Sodium Benzoate :** Dangerous Material Safety Management Regulation
**D. Wastes Control Act**
**Silicone emulsion :** Wastes Control Act CAS No. 63148-62-9; Controlled wastes
**E. Other regulation (internal and external)**
**Internal information**
**Persistant Organic Pollutants Acts** Not regulated
**External information**
**EU classification(classification)**
**Water :** Classification Not classified
**Poyethylene glycol lauryl ether :** Classification Not classified
**GLYCEROL :** Classification Not classified
**Butane :** Classification F+; R12
**EU classification(risk phrases)**
**Water :** Hazard statements Not applicable
**Poyethylene glycol lauryl ether :** Hazard statements Not applicable
**GLYCEROL :** Hazard statements Not applicable
**Butane :** Hazard statements R12
**EU classification(safety phrases)**
**Water :** Precautionary statements Not applicable
**Poyethylene glycol lauryl ether :** Precautionary statements Not applicable
**GLYCEROL :** Precautionary statements Not applicable
**Butane :** Precautionary statements S2, S9, S16
**EU SVHC list** Not regulated
**EU Authorisation List** Not regulated
**EU Restriction list** Not regulated
**U.S.A management information (OSHA Regulation)** Not regulated
**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)** Not regulated
**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

**Poyethylene glycol lauryl ether**
U.S.A management information Section 8(b) Inventory (TSCA): XU
Japan management information Existing and New Chemical Substances (ENCS): (7)-97
China management information Inventory of Existing Chemical Substances (IECSC): Present30614
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: HSR003168
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

**GLYCEROL**
U.S.A management information Section 8(b) Inventory (TSCA): Present
Japan management information Existing and New Chemical Substances (ENCS): (2)-242
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): May be used as a single component chemical under an appropriate group standard.
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

**Sodium Benzoate**
U.S.A management information Section 8(b) Inventory (TSCA): Present
Japan management information Existing and New Chemical Substances (ENCS): (3)-1293; (3)-1272; (3)-1076
China management information Inventory of Existing Chemical Substances (IECSC): Present 02575
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: HSR002716
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

**Butane**
U.S.A management information Section 8(b) Inventory (TSCA): Present
Japan management information Existing and New Chemical Substances (ENCS): (2)-4
China management information Inventory of Existing Chemical Substances (IECSC): Present 41372
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: HSR000989
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

## 16. Other information

**A. Information source and references**
DOW CORNING MSDS

U.S. National library of Medicine(NLM) Hazardous Substances Data Bank(HSDB); http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
EPISUITE v4.1; http://www.epa.gov/opt/exposure/pubs/episuitedl.htm
U.S. National library of Medicine(NLM) ChemIDplus; http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CHEM
National Emergency Management Agency-Korea dangerous material inventory management system; http://www.nema.go.kr/hazmat/main/main.jsp
Korea Occupational Health & Safety Agency; http://www.kosha.net
OECD SIDS; http://webnet.oecd.org/hpv/ui/Search.aspx
ECOTOX; http://cfpub.epa.gov/ecotox/
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr
AKRON; http://ull.chemistry.uakron.edu/erd
National Chemicals Information System; http://ncis.nier.go.kr/ncis/
TOMES-LOLI®; http://www.rightanswerknowledge.com/loginRA.asp
Waste Control Act enforcement regulation attached [1]
The Chemical Database -The Department of Chemistry at the University of Akron; http://ull.chemistry.uakron.edu/erd/
National Toxicology Program; http://ntp-apps.niehs.nih.gov/ntp_tox/index.cfm
DOW CONRNING MSDS
American Conference of Governmental Industrial Hygienists TLVs and BEIs.
NIOSH Pocket Guide; http://www.cdc.gov/niosh/npg/npgdcas.html
National Institute of Technology and Evaluation(NITE); http://www.safe.nite.go.jp/english/db.html
REACH information on registered substances; http://apps.echa.europa.eu/registered/registered-sub.aspx
EU CLP; http://esis.jrc.ec.europa.eu/index.php?PGM=cla

**B. Issuing date** 2013.12.05.

**C. Revision number and date**

**revision number** 1

**date of the latest revision** 2014.06.13.

**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.
•The content of the MSDS may vary depending on the country or the region and may not coincide with the actual regulations. Therefore, the buyer or the processor of the chemical is responsible for observing responsible government’s or the region’s regulations.