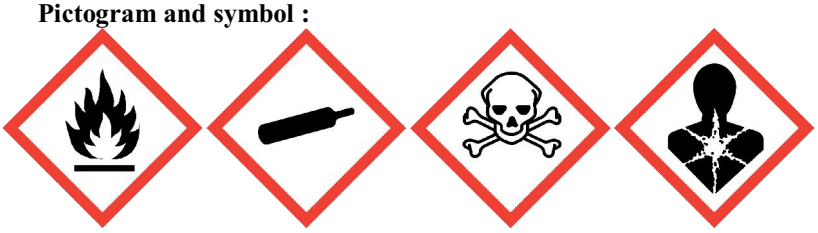
MATERIAL SAFETY DATA SHEET

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

A. GHS product identifier RainOK DEICER
B. Recommended use of the chemical and restrictions on use
Recommended use Melts precipitation to reduce adherence of frost, ice, and snow
Restrictions on use Use only for intended purpose
C. Manufacturers
Company name Bullsone
Address 7F, Dabong Tower, 418, Teheran-ro Gangnam-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
Flammable liquids : Category 2
Gases under pressure : Liquefied gas
Acute toxicity (oral) : Category 4
Acute toxicity (dermal) : Category 3
Acute toxicity (inhalation:vapours) : Category 3
Serious eye damage /eye irritation : Category 2A
Specific target organ toxicity (single exposure) : Category 1
Specific target organ toxicity (single exposure) : Category 3 (narcotic effects)
B. GHS label elements, including precautionary statements
Pictogram and symbol :



Signal word : Danger
Hazard statements :
H225 Highly flammable liquid and vapour
H280 Contains gas under pressure; may explode if heated.
H302 Harmful if swallowed.
H311 Toxic in contact with skin.
H319 Causes serious eye irritation
H331 Toxic if inhaled.
H336 May cause drowsiness or dizziness.
H370 Causes damage to organs.
Precautionary statements
Precaution
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ventilating/lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Treatment

P301+P312 If swallowed: Call a poison center or doctor/physician if you feel unwell.
P302+P352 If on skin: Wash with plenty of soap and water.
P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P307+P311 If exposed: Call a poison center or doctor/physician.
P311 Call a poison center or doctor/physician.
P312 Call a poison center or doctor/physician if you feel unwell.
P330 Rinse mouth.
P337+P313 If eye irritation persists: Get medical advice/attention.
P361 Remove/Take off immediately all contaminated clothing.
P363 Wash contaminated clothing before reuse.
P370+P378 In case of fire: Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material for extinction.

Storage

P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P403+P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
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 2
Flammability 1
Reactivity Not available

3. Composition/information on ingredients

Chemical Name	Common Name(Synonyms)	CAS number	EC number	Content (%)
Iso-propyl alcohol	Isopropanol	67-63-0	200-661-7	20~40
Methanol	Methyl alcohol	67-56-1	200-659-6	20~40
ethyleneglycol	ethyleneglycol			1~10
Carbon dioxide	Carbonic acid gas	124-38-9	204-696-9	1~ 5
Water		7732-18-5	231-791-2	10~20

4. First aid measures

A. Eye contact

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If eye irritation persists: Get medical advice/attention.
- If eye irritation persists: Get medical advice/attention.

B. Skin contact

- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- If exposed: Call a poison center or doctor/physician.
- If exposed: Call a poison center or doctor/physician.
- Wash contaminated clothing before reuse.
- Wash contaminated clothing before reuse.
- Remove and isolate contaminated clothing and shoes.
- Remove and isolate contaminated clothing and shoes.
- For minor skin contact, avoid spreading material on unaffected skin.
- For minor skin contact, avoid spreading material on unaffected skin.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Wash skin with soap and water.
- Wash skin with soap and water.

C. Inhalation

- Call a poison center or doctor/physician.
- Call a poison center or doctor/physician.
- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.
- If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.

D. Ingestion

- If exposed: Call a poison center or doctor/physician.
- If exposed: Call a poison center or doctor/physician.
- Rinse mouth.
- Rinse mouth.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

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.
- 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

- Highly flammable liquid and vapour
- Contains gas under pressure; may explode if heated.
- May violently polymerize and result in fire and explosion.
- Vapors may travel to a source of ignition and ignite.
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning
- May form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Spilled material may create fire or explosion hazard.

- May cause vapor explosion hazard indoors, outdoors or in sewers.
- Some of these materials may burn, but none ignite readily.
- Vapors may form explosive mixtures with air.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.
- Some of these materials, if spilled, may leave a flammable residue after evaporation

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.
- Many liquids are lighter than water.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas
- Substance may be transported hot.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Substance may be transported in a molten form.
- Ruptured cylinders may rocket.
- 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; 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.
- Fire involving Tanks; For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- 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

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- The very fine particles may cause a fire or explosion, eliminate all ignition sources.
- The very fine particles may cause a fire or explosion, eliminate all ignition sources.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Isolate hazard area.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Keep unnecessary and unprotected personnel from entering.
- Eliminate all ignition sources.
- Eliminate all ignition sources.
- All equipment used when handling the product must be grounded.
- All equipment used when handling the product must be grounded.
- Stop leak if you can do it without risk.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- A vapor suppressing foam may be used to reduce vapors.
- A vapor suppressing foam may be used to reduce vapors.
- Cover with plastic sheet to prevent spreading.
- Cover with plastic sheet to prevent spreading.
- Please note that there are materials and conditions to avoid.
- 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.

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

C. The methods of purification and removal

- Dike and collect water used to fight fire.
- Dike and collect water used to fight fire.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Reduce dust and prevent scattering by moistening with water.
- Reduce dust and prevent scattering by moistening with water.
- Absorb the liquid and scrub the area with detergent and water.
- Absorb the liquid and scrub the area with detergent and water.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- Use clean non-sparking tools to collect absorbed material.
- Use clean non-sparking tools to collect absorbed material.

7. Handling and storage

A. Precautions for safe handling

- Use explosion-proof electrical/ventilating/lighting equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash ... thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Use only outdoors or in a well-ventilated area.
- 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.
- Use carefully in handling/storage.
- Loosen closure cautiously before opening.
- All equipment used when handling the product must be grounded.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.
- Be careful to heat.
- You need measurement of air concentration and ventilation in low, closed and confined areas due to lack of oxygen.

B. Conditions for safe storage

- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Store in a well-ventilated place. Keep container tightly closed.
- Store in a well-ventilated place. Keep cool.
- Protect from sunlight. Store in a well-ventilated place.
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Containers can build up pressure if exposed to heat (fire).
- Keep away from food and drinking water.

8. Exposure controls/personal protection

A. Occupational Exposure limits

Korea regulation

Iso-propyl alcohol TWA = 200 ppm (480 mg/m³) , STEL = 400 ppm (980 mg/m³)
Methanol TWA = 200 ppm (260 mg/m³)
ethyleneglycol CAS No. 107-21-1; STEL: 40 ppm (100 mg/m³)
Carbon dioxide TWA = 5000 ppm (9000 mg/m³) , STEL = 30000 ppm (54000 mg/m³)

ACGIH regulation

Iso-propyl alcohol TWA 200 ppm STEL 400 ppm

Methanol TWA 200 ppm STEL 250 ppm
Carbon dioxide TWA 5000 ppm

Biological exposure index
Methanol 15 mg/L

OSHA regulation
Iso-propyl alcohol TWA = 400 ppm (980 mg/m³)
Methanol TWA = 200 ppm (260 mg/m³)
Carbon dioxide TWA=5000 ppm(9000 mg/m³) STEL=30000 ppm(54000 mg/m³)

NIOSH regulation
Iso-propyl alcohol TWA = 400 ppm (980 mg/m³), STEL = 500 ppm (1225 mg/m³)
Methanol TWA = 200 ppm (260 mg/m³), STEL = 250 ppm (325 mg/m³)
Carbon dioxide TWA=5000 ppm(9000 mg/m³) STEL=30000 ppm(54000 mg/m³)

EU regulation
Carbon dioxide TWA= 5000 ppm(9000 mg/m³)

Other
Iso-propyl alcohol Australia: TWA = 400 ppm (983 mg/m³) Belgium: STEL = 400 ppm (1000 mg/m³), TWA = 200 ppm (500 mg/m³) Canada: STEL = 400 ppm (984 mg/m³), TWA = 200 ppm (492 mg/m³) Czech Republic: TWA = 500 mg/m³ Greece: STEL = 500 ppm (1225 mg/m³), TWA = 400 ppm (980 mg/m³)
Methanol Australia: TWA = 200 ppm (262 mg/m³), STEL = 250 ppm (328 mg/m³) Belgium: TWA = 200 ppm (266 mg/m³), STEL = 250 ppm (333 mg/m³) Canada-alberta: TWA = 200 ppm (262 mg/m³), STEL = 250 ppm (328 mg/m³) China: TWA = 25 mg/m³, STEL = 50 mg/m³ Denmark: TWA = 200 ppm (260 mg/m³)

B. Appropriate engineering controls

- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- 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

B. Odor

C. Odor threshold Not available
D. pH 8.7 ~ 10.7
E. Melting point/freezing point -60 ℃
F. Initial boiling point and boiling range 65 ℃
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) g/100g
M. Vapor density Not available
N. Specific gravity 0.874 ± 0.005
O. Partition coefficient: n-octanol/water Not available
P. Auto ignition temperature Not available
Q. Decomposition temperature Not available
R. Viscosity 1~500cP cP
S. Molecular weight Not available

10. Stability and reactivity

A. Chemical stability and Possibility of hazardous reactions:
- Highly flammable liquid and vapour
- Contains gas under pressure; may explode if heated.
- May decompose at high temperatures into forming toxic gases.
- May violently polymerize and result in fire and explosion.
- May form explosive mixtures at temperatures at or above the flashpoint.
- Containers may explode when heated.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Spilled material may create fire or explosion hazard.
- May cause vapor explosion hazard indoors, outdoors or in sewers.
- Some of these materials may burn, but none ignite readily.
- Vapors may form explosive mixtures with air.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.

B. Conditions to avoid:
- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

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

11. Toxicological information

A. Information of Health Hazardous:

Acute toxicity

Oral [Category 4] (ATEmix = 314.12 mg/kg bw)

- **Iso-propyl alcohol** : Rat LD_{50} = 5,840 mg/kg (OECD TG 401)
- **Methanol** : Rat LD_{50} = 100 mg/kg
- **ethyleneglycol** : Rat $LD_{50} \leq$ 2,000 mg/kg (> 2,000 mg/kg), 1,2-Ethanediol(Oral), Adult:1.2 ~ 1.5 g/kg, Consciousness is damaged, kidney damage, central nervous system damage: This symptom / jindang / findings may due to the low dose

Dermal [Category 3] (ATEmix = 946.73 mg/kg bw)

- **Iso-propyl alcohol** : Rabbit LD_{50} = 12,792 mg/kg (OECD TG 402)
- **Methanol** : Rabbit LD_{50} = 300 mg/kg
- **ethyleneglycol** : Rabbit LD_{50} > 2,000 mg/kg

Inhalation [Category 3] (ATEmix = 8.78 mg/L)

- **Iso-propyl alcohol** : Rat LC_{50} > 30.13 mg/L/4hr (OECD TG 403, GLP)
- **Methanol** : Rat LC_{50} = 3 mg/L/4hr

Skin corrosion/ irritation [Not classified]

- **Iso-propyl alcohol** : In test on skin irritation with rabbits, skin irritations were not observed.
- **Methanol** : In a test with rabbits, this substance was not a skin irritating.
- **ethyleneglycol** : In skin irritation test with rabbits, skin irritations were not observed.

Serious eye damage/ irritation [Category 2A]

- **Iso-propyl alcohol** : In test on eye irritation with rabbits, serious eye irritations were observed. Also the results demonstrate a trend in reversibility.
- **Methanol** : In eyes irritation test with rabbits, moderate irritations were observed.
- **ethyleneglycol** : In eye irritation test with rabbits, eye irritations were not observed

Respiratory sensitization [Not classified]

Skin sensitization [Not classified]

- **Iso-propyl alcohol** : Isopropyl alcohol did not induce sensitization in the guinea pig model.(OECD TG 406, GLP)
- **Methanol** : In a LLNA with guinea-pigs, this substance was not classified as skin sensitiser.(OECD TG 429)

Carcinogenicity [Not classified]

IARC

- Iso-propyl alcohol : Group 3

ACGIH

- Iso-propyl alcohol : A4

Iso-propyl alcohol : In study with mice, there were no nonneoplastice or neoplastic lesions observed that were believed to be related to the isopropanol exposures.(OECD TG 451, GLP)

Methanol : The result gave no evidence of a cancerogenic potential of methanol in mice(OECD TG 453).

Mutagenicity [Not classified]

- **Iso-propyl alcohol** : Negative reactions were observed in both in vitro(Ames test, mammalian cell gene mutation assay, sister chromatid exchange assay) and in vivo micronucleus assay.
- **Methanol** : Negative reactions were observed in both in vitro mammalian cell gene mutation test (OECD TG 476), bacterial reverse mutation assay (OECD TG 471) and in vivo micronucleus assay (OECD TG 474).

Reproductive toxicity [Not classified]

- **Iso-propyl alcohol** : There was 100% fertility among all rats but evidence of embryotoxicity (i.e., fewer live pups were produced and there was also an increase in pup mortality and a reduction in pup weight gain) at the 2 highest dose-levels. In the group given 2.5% IPA, the dams with litters showed signs of stress.Decreased mean fetal body weight at higher dose levels.(OECD TG 415, OECD TG 414, GLP)
- **Methanol** : In reproductive toxicity test with mice, adverse effects were not observed.

Specific target organ toxicity (single exposure) [구분 3 (마취작용)] [null]

- **Iso-propyl alcohol** : In the 10000 ppm group, prostration, severe ataxia, decreased arousal, slowed or labored respiration, decreased neuromuscular tone, hypothermia, and loss of reflex function was observed after exposure.(OECD TG 403, GLP)
- **Methanol** : In a oral acute dose toxicity study, this material may cause effects on the central nervous system.
- **ethyleneglycol** : In acute oral toxicity test with rats, acute toxic effects were not observed.

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

- **Iso-propyl alcohol** : Repeated exposure to IPA for 98 days produced toxic effects only at the highest concentration (5000 ppm) and a kidney change of unknown biological signifiance. Decreases in absolute body weight and body weight gain, and changes in hematology parameters in

animals exposed to 1500 and 5000 ppm of isopropanol, increased relative liver weight in male and female rats exposed to 5000 ppm, as well as increased motor activity for female rats in the 5000 ppm group have been observed.

- **Methanol** : In a repeated dose toxicity study with rats, this material showed no signs.

Aspiration Hazard [Not classified]

12. Ecological information

A. Ecological toxicity

- Acute toxicity : [Not classified] (ATEmix = 1275.89337mg/ℓ)
- Chronic toxicity : [Not classified]

Fish

- **Iso-propyl alcohol :** 96hr-LC_{50} (*Pimephales promelas*) = 9640 mg/L (OECD TG 203)
- **Methanol :** 96hr-LC_{50} = 15400 mg/L (EPA-660/3-75-009), 8.3d-NOEC(Oryzias latipes) = 15,800 mg/L
- **ethyleneglycol :** 96hr-LC_{50} > 100 mg/L
- **Carbon dioxide :** 96hr-LC_{50} = 35 mg/L

crustacean

- **Iso-propyl alcohol :** 24hr-LC_{50} (*Daphnia magna*) > 10000 mg/L (OECD TG 202)
- **Methanol :** 48hr-EC_{50} > 10000 mg/L (DIN 38412 Teil 11)
- **ethyleneglycol :** 48hr-EC_{50} > 100 mg/L

Algae

- **Methanol :** 96hr-EC_{50} (*Selenastrum capricornutum*) = 22000 mg/L (OECD TG 201)
- **ethyleneglycol :** 72hr-EC_{50} > 100 mg/L Aquatic Plant

B. Persistence and degradability

Persistence

- **Iso-propyl alcohol** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.05)
- **Methanol** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -0.77)
- **Carbon dioxide** : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 0.83)

Degradability

- **ethyleneglycol** : > 70% DOC reduction (OECD 301 A (new edition)) is readily biodegradable

C. Bioaccumulative potential

Bioaccumulation

- **Iso-propyl alcohol** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3) (estimated)
- **Methanol** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 1 ~ 4.5) (Cyprinus carpio)

Biodegradation

- **Iso-propyl alcohol** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (BOD/COD = 0.53)
- **Methanol** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (= 71.5% biodegradation was observed after 5 days)

D. Mobility in soil

- **Iso-propyl alcohol** : Low potency of mobility to soil. (Koc = 25) (estimated)
- **Methanol** : Low potency of mobility to soil. (Koc = 1.224) (estimated)

E. Other hazardous effect

- **ethyleneglycol** : 1,2-Ethanediol : - Keep the MAK value, the development of the embryo or fetus is no risk of damage. - All information is available from the risk of skin resorption effects not shown for carcinogenicity.

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
Iso-propyl alcohol : Administration subject listed
Iso-propyl alcohol : Occupational exposure limits listed
Iso-propyl alcohol : Work environment monitoring listed (6 months)
Iso-propyl alcohol : Health examination agent (12 months)
Methanol : Administration subject listed
Methanol : Occupational exposure limits listed
Methanol : Work environment monitoring listed (6 months)
Methanol : Health examination agent (12 months)
ethyleneglycol : Administration subject listed : CAS No. 107-21-1
ethyleneglycol : Occupational exposure limits listed : CAS No. 107-21-1
ethyleneglycol : Work environment monitoring listed (6 months): CAS No. 107-21-1
ethyleneglycol : Health examination agent (12 months): CAS No. 107-21-1
Carbon dioxide : Occupational exposure limits listed
B. Toxic Chemical Control Act
Iso-propyl alcohol : Existing Chemical Substance (KE-29363)
Methanol : Accident Precaution Chemicals
Methanol : Existing Chemical Substance (KE-23193)
Methanol : Toxic Chemicals (97-1-80 85% or more in mixtures)
ethyleneglycol : Existing Chemical Substance ;CAS No. 107-21-1: KE-13169
Water : Existing Chemical Substance (KE-35400)
C. Dangerous Material Safety Management Regulation
Iso-propyl alcohol : Dangerous Material Safety Management Regulation 400ℓ
Methanol : Dangerous Material Safety Management Regulation 400ℓ
ethyleneglycol : Dangerous Material Safety Management Regulation CAS No. 107-21-1; Petroleum class 4-3 (water soluble liquid) 4000ℓ
D. Wastes Control Act
Iso-propyl alcohol : Wastes Control Act Controlled Wastes
Methanol : Wastes Control Act Controlled Wastes
E. Other regulation (internal and external)
Internal information
Persistant Organic Pollutants Acts Not regulated
External information
EU classification(classification)
Iso-propyl alcohol : Classification F; R11 Xi; R36 R67
Methanol : Classification F; R11T; R23/24/25-39/23/24/25
Water : Classification Not classified
EU classification(risk phrases)
Iso-propyl alcohol : Hazard statements R11 R36 R67
Methanol : Hazard statements R11 R23/24/25 R39/23/24/25
Water : Hazard statements Not applicable
EU classification(safety phrases)

Iso-propyl alcohol : Precautionary statements S2 S7 S16 S24/25 S26
Methanol : Precautionary statements S1/2 S7 S16 S36/37 S45
Water : Precautionary statements Not applicable

EU SVHC list Not regulated
EU Authorisation List Not regulated
EU Restriction list
Methanol : EU Restriction list Regulated
U.S.A management information (OSHA Regulation) Not regulated
U.S.A management information (CERCLA Regulation)
Methanol : CERCLA RQ 5000 lb
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)
Methanol : EPCRA 313 Regulated
Substance of Roterdame Protocol Not regulated
Substance of Stockholme Protocol Not regulated
Substance of Montreal Protocol Not regulated

Foreign Inventory Status

Iso-propyl alcohol
U.S.A management information Section 8(b) Inventory (TSCA): Present
Japan management information Existing and New Chemical Substances (ENCS): (2)-207, Industrial Safety and Health Law Substances (ISHL): 2-(8)-319
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: HSR001180
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

Methanol
U.S.A management information Section 8(b) Inventory (TSCA): 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: HSR001186
Japan management information Existing and New Chemical Substances (ENCS): (2)-201
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present
China management information Inventory of Existing Chemical Substances (IECSC): Present

Carbon dioxide
U.S.A management information Section 8(b) Inventory (TSCA): Present
Japan management information Existing and New Chemical Substances (ENCS): (1)-169
China management information Inventory of Existing Chemical Substances (IECSC): Present 11378
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: HSR001018
Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

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

16. Other information

A. Information source and references

International Programme on Chemical Safety(IPCS) International Chemical Safety Cards (ICSCs); http://www.inchem.org/
U.S. National library of Medicine(NLM) Hazardous Substances Data Bank(HSDB); http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
Emergency Response Guidebook 2008; http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/erg2008_eng.pdf
EPISUITE v4.1; http://www.epa.gov/opt/exposure/pubs/episuitedl.htm
U.S. National library of Medicine (NLM) Hazardous Substances Data Bank (HSDB) : http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.htm
National Emergency Management Agency-Korea dangerous material inventory management system; http://www.nema.go.kr/hazmat/main/main.jsp
OECD SIDS: http://webnet.oecd.org/hpv/ui/Search.aspx
Korea Occupational Health & Safety Agency; http://www.kosha.net
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr
AKRON; http://ull.chemistry.uakron.edu/erd
BASF Korea MSDS
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
American Conference of Governmental Industrial Hygienists TLVs and BEIs.
NIOSH Pocket Guide; http://www.cdc.gov/niosh/npg/npgdcas.html
REACH information on registered substances : http://apps.echa.europa.eu/registered/registered-sub.aspx#search
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
UN Recommendations on the transport of dangerous goods 17th

B. Issuing date 21. Oct. 2013

C. Revision number and date

revision number 1
date of the latest revision 2014.07.15.

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.