

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	80~90
Secret material	Secret material			< 1
Water		7732-18-5	231-791-2	10~20

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

- If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- Call a poison center or doctor/physician if you feel unwell.
- Call emergency medical service.
- Remove and isolate contaminated clothing and shoes.
- 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.
- Wash skin with soap and water.

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

- Highly flammable liquid and vapour
- 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.

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.
- Substance may be transported in a molten form.
- 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.
- The very fine particles may cause a fire or explosion, eliminate all ignition sources.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Eliminate all ignition sources.
- All equipment used when handling the product must be grounded.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- A vapor suppressing foam may be used to reduce vapors.
- Cover with plastic sheet to prevent spreading.
- 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

- 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 the liquid and scrub the area with detergent and water.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- 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.
- 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.
- 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**

Iso-propyl alcohol TWA = 200 ppm (480 mg/m³), STEL = 400 ppm (980 mg/m³)

Nitric acid TWA = 2 ppm (5 mg/m³), STEL = 4 ppm (10 mg/m³)

ACGIH regulation

Iso-propyl alcohol TWA 200 ppm STEL 400 ppm

Nitric acid TWA 2 ppm 5 mg/m³ STEL 4 ppm 10 mg/m³

Biological exposure index : Not available

OSHA regulation

Iso-propyl alcohol TWA = 400 ppm (980 mg/m³)

NIOSH regulation

Iso-propyl alcohol TWA = 400 ppm (980 mg/m³), STEL = 500 ppm (1225 mg/m³)

Nitric acid TWA = 2 ppm (5 mg/m³), STEL = 4 ppm (10 mg/m³)

EU regulation

Nitric acid STEL = 1 ppm (2.6 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)

Nitric acid Australia: TWA = 2 ppm (5.2 mg/m³), STEL = 4 ppm (10 mg/m³) Canada: TWA = 2 ppm (5.2 mg/m³), STEL = 4 ppm (10 mg/m³) China: TWA = 20 mg/m³, STEL = 40 mg/m³ UK: STEL = 1 ppm (2.6 mg/m³)

B. Appropriate engineering controls

- 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 2.5 ~ 3.5

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 0.815 +/- 0.005

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:

- Highly flammable liquid and vapour
- 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.
- Fire will produce irritating, corrosive and/or toxic gases.

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 [Not classified] (ATEmix = 6,529.52 mg/kg bw)

- **Iso-propyl alcohol** : Rat LD₅₀ = 5,840 mg/kg (OECD TG 401)
- **Heptadecafluorodecyltriis oproxysilane** : Rat LD₅₀ = mg/kg Harmful

Dermal [Not classified] (ATEmix = 14,302.33 mg/kg bw)

- **Iso-propyl alcohol** : Rabbit LD₅₀ = 12,792 mg/kg (OECD TG 402)

Inhalation [Not classified] (ATEmix = 2,012.5 mg/L)

- **Iso-propyl alcohol** : Rat LC₅₀ > 30.13 mg/L/4hr (OECD TG 403, GLP)
- **Heptadecafluorodecyltriis oproxysilane** : Rat LD₅₀ = mg/kg Throat irritation, bronchitis, pneumonia, and pulmonary edema may cause.
- **Nitric acid** : Rat LC₅₀ = 3.22 mg/L/4hr (OECD TG 403, GLP)

Skin corrosion/ irritation [null]

- **Iso-propyl alcohol** : In test on skin irritation with rabbits, skin irritations were not observed.
- **Heptadecafluorodecyltriis oproxysilane** : Causes inflammation and irritation to the skin.
- **Nitric acid** : Nitric acid is highly corrosive to skin of animals and humans due to its strong acidic nature.

Serious eye damage/ irritation [null]

- **Iso-propyl alcohol** : In test on eye irritation with rabbits, serious eye irritations were observed. Also the results demonstrate a trend in reversibility.
- **Heptadecafluorodecyltriis oproxysilane** : Temporary irritation.
- **Nitric acid** : Based on the result that Nitric acid is highly corrosive to eyes of animals and humans due to its strong acidic nature, this chemical is also considered to be corrosive to the eyes.

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)

Carcinogenicity [Not classified]**IARC**

- **Iso-propyl alcohol** : Group 3
ACGIH

- **Iso-propyl alcohol** : A4

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

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.
- **Nitric acid** : Nitric acid (evaluated as NO₃⁻ in several of these tests) is not expected to be genotoxic.

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)
- **Nitric acid** : Nitric acid is not expected to result in reproductive toxicity.

Specific target organ toxicity (single exposure)

- **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)
- **Nitric acid** : No indications of systemic toxicity or cause of death were revealed.

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 significance. 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.
- **Nitric acid** : No adverse effects were seen on reproduction/developmental toxicity endpoints. (GLP)

Aspiration Hazard [Not classified]

12. Ecological information

A. Ecological toxicity

- Acute toxicity : [Not classified] (ATEmix = 7791.14817mg/ℓ)
- Chronic toxicity : [Not classified]

Fish

- **Iso-propyl alcohol** : 96hr-LC₅₀ (*Pimephales promelas*) = 9640 mg/L (OECD TG 203)
- **Nitric acid** : 96hr-LC₅₀ = 72 mg/L

crustacean

- **Iso-propyl alcohol** : 24hr-LC₅₀ (*Daphnia magna*) > 10000 mg/L (OECD TG 202)

Algae Not available

B. Persistence and degradability

Persistence

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

Degradability Not available

C. Bioaccumulative potential

Bioaccumulation

- **Iso-propyl alcohol** : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3) (estimated)

Biodegradation

- **Iso-propyl alcohol** : As well-biodegraded, it is expected to have low accumulation potential in living organisms (BOD/COD = 0.53)

D. Mobility in soil

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

E. Other hazardous effect

- **Heptadecafluorodecyltriisoproxyisilane** : This product contains oxygen in the atmosphere at about 150 °C or more of formaldehyde must be generated containing the methylpolysiloxanes.

Formaldehyde on the skin and the respiratory tract sensitizer, eye and throat irritant, acute toxicant, and potential cancer-causing substance is harmful.

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 1993

B. UN Proper shipping name FLAMMABLE LIQUID, N.O.S.

C. Transport Hazard class 3

D. Packing group II

E. Marine pollutant

F. Special precautions

in case of fire F-E

in case of leakage S-E

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)

Nitric acid : Administration subject listed

Nitric acid : Occupational exposure limits listed

Nitric acid : Work environment monitoring listed (6 months)

Nitric acid : Health examination agent (12 months)

B. Toxic Chemical Control Act

Iso-propyl alcohol : Existing Chemical Substance (KE-29363)

Nitric acid : Accident Precaution Chemicals

Nitric acid : Existing Chemical Substance (KE-25911)

Nitric acid : Toxic Chemicals (97-1-246 10% or more in mixtures)

Water : Existing Chemical Substance (KE-35400)

C. Dangerous Material Safety Management Regulation

Iso-propyl alcohol : Dangerous Material Safety Management Regulation 400ℓ

Heptadecafluorodecyltriisoproxysilane : Dangerous Material Safety Management Regulation
Petroleum class 4-3 (non-water soluble liquid) 2000ℓ;(water soluble liquid) 4000ℓ

Nitric acid : Dangerous Material Safety Management Regulation 300 kg

D. Wastes Control Act

Iso-propyl alcohol : Wastes Control Act Controlled Wastes

Nitric acid : Wastes Control Act Controlled wastes

E. Other regulation (internal and external)

Internal information

Persistent Organic Pollutants Acts Not regulated

External information

EU classification(classification)

Iso-propyl alcohol : Classification F; R11 Xi; R36 R67

Nitric acid : Classification O; R8 C; R35

Water : Classification Not classified

EU classification(risk phrases)

Iso-propyl alcohol : Hazard statements R11 R36 R67

Nitric acid : Hazard statements R8 R35

Water : Hazard statements Not applicable

EU classification(safety phrases)

Iso-propyl alcohol : Precautionary statements S2 S7 S16 S24/25 S26

Nitric acid : Precautionary statements S1/2 S23 S26 S36 S45

Water : 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)

Nitric acid : OSHA1910 500 lb

U.S.A management information (CERCLA Regulation)

Nitric acid : CERCLA RQ 1000 lb

U.S.A management information (EPCRA 302 Regulation)

Nitric acid : EPCRA 302 TPQ 1000 lb

U.S.A management information (EPCRA 304 Regulation)

Nitric acid : EPCRA 304 RQ 1000 lb

U.S.A management information (EPCRA 313 Regulation)

Nitric acid : 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

Heptadecafluorodecyltriisoproxysilane

JFSL Dangerous goods Petroleum class 4-3

Nitric acid

U.S.A management information Section 8(b) Inventory (TSCA): Present

Canada management information Domestic Substances List (DSL): Present

China management information Inventory of Existing Chemical Substances (IECSC): Present 35578

Japan management information Existing and New Chemical Substances (ENCS): (1)-394

New Zealand management information Inventory of Chemicals (NZIoC): HSNO

Approval: HSR001515

Philippines management information Inventory of Chemicals and Chemical Substances (PICCS): Present

Australia management information Inventory of Chemical Substances (AICS): 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

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
 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>
 National Chemicals Information System; <http://ncis.nier.go.kr/ncis/>
 TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>
 International Uniform Chemical Information Database (IUCLID) (<http://ecb.jrc.it/esis>)
 Momentive Performance Materials MSDS
 Waste Control Act enforcement regulation attached [1]
 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>
 AKRON: <http://ull.chemistry.uakron.edu/erd>
 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 Mar 03. 2014

C. Revision number and date

revision number

date of the latest revision

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.