



MATERIAL SAFETY DATA SHEET

1 . Product Identification

1) Product name : ISOPROPYL ALCOHOL

2) Advisable use and Restriction

Advisable use :

- Solvent (oils, gums, waxes, resins, alkaloids, cements, primers, varnishes, paints, printing inks)

- Medical (antiseptic disinfectant for home, hospital, and industry ; rubbing alcohol)

Restriction of product using: Not available

2 . Hazard Identification

1) GHS classification of the substance :

- Flammable liquid: Category 2

- Eye Damage/Irritation : Category 2 A

- Specific target organ toxicity (single exposure) : Category 3(respiratory tract irritation, narcotic effect)

2) GHS label elements, including precautionary statements

Pictogram and symbol: :



Signal word: Danger

Hazard statements

H225: Highly flammable liquid and vapour

H319: Causes serious eye damage

H335: May cause respiratory irritation H336:

May cause drowsiness or dizziness

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+P261: Do not breathe dust/fume/gas/mist/vapours/spray. P264:
Wash thoroughly after handling.

P271: Use only outdoors or in a well-ventilated areas.

P280: Wear protective gloves/protective clothing/eye protection/face protection.

- Treatment:

P303+P361+P353: If On SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.

P370+P378: In Case of Fire: Use water spray, Carbon dioxide, alcohol-resistant foam, Dry chemical, general foam.

P337+P313: If eye irritation persists: Get medical advice/attention.

P305+P351+P338: IF IN EYES: Rinse continuously with water for several minutes.

Remove contact lenses if present and easy to do. Continue rinsing.

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.

- Storage: P403+P235+P233: Store in a well ventilated place. Keep cool and container tightly closed. P405: Store locked up.

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

3) Other hazard information not included in hazard classification

○ NFPA : - Health: 2, Fire: 3, Reactive: 0

3 . Composition/information on ingredients

Chemical Name	Common Name Synonyms	CAS No.	Content (%)
Isopropyl alcohol (CH ₃ CHOHCH ₃)	ISOPROPANOL, 2-PROPANOL, PROPYL ALCOHOL, ETHYL CARBINOL	67-63-0	> 99.8

4 . First aid measures

1) Eye contact

-In case of contact with substance, immediately flush eyes with running water for more than 15 minutes.

-Get immediate medical advice/attention.

2) Skin contact

- Wash with a plenty of water and soap.
- If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water.
- Wash and dry carefully before reuse.
- Where there is evidence of skin irritation, get medical attention.

3) Inhalation

- Move victim to place with fresh air and not contaminated area.
- Allow the victim to rest in a well-ventilated area.
- If breathing has stopped, perform artificial respiration. -
- Get medical attention as soon as possible.

4) Ingestion

- Seek immediate medical attention if large quantities are ingested.
- Do not induce vomiting.
- If no consciousness, do not ingest.

5) Acute and delayed symptoms/effects

- Acute effect: The substance is irritating to the eyes and the respiratory tract. The substance may cause effects on the central nervous system, resulting in depression. Exposure far above the OEL may result in unconsciousness.
- Delayed Symptoms: The liquid defeats the skin.

6) Indication of immediate medical attention and notes for physician -Get immediate medical

- advice/attention if exposure -Keep victim warm and quiet.
- Move victim to fresh air.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.

5 . Fire fighting measures

1) Suitable (and unsuitable) extinguishing media

- suitable extinguishing media: Dry chemical, CO₂, alcohol-resistant foam or water spray
- unsuitable extinguishing media: Do not use straight streams. Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane. ○ In case of major fire and large quantities:
 - Water spray, fog or alcohol-resistant foam.
- tank/trailer/train truck fire:
 - Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
 - Do not get water inside containers.
 - Cool containers with flooding quantities of water until well after fire is out.

2) Specific hazards arising from the chemical

- Thermal decomposition products

-Those substances may polymerize explosively when heated or involved in a fire. -
When heated to decomposition it emits acrid smoke and fumes.

○ Fires or explosion

- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapours may explode when mixed with air.
- Vapour or gas may travel from a distance in an instance after ignition.
- When heated, vapours may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Containers may explode when heated.

3) Special protective equipment and precautions for fire-fighters -Move containers from fire area if you can do it without risk.

- Cool containers with flooding quantities of water until well after fire is out.
- Sprinkle with fine water spray volume.
- Do not extinguish fire unless flow can be stopped.
- Use a fire extinguisher appropriate for surroundings fire.
- Do not inhale the substance itself or the burning artifact.
- Stay up wind and keep out of low areas.
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
- ALWAYS stay away from tanks engulfed in fire.
- Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

6 . Accidental release measures

1) Personal precautions, protective equipment and emergency procedures -Stop leak if you can do it without risk.

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Keep unauthorized personnel away.
- Leak immediately, prevent using proper protective equipment.
- Ventilate enclosed areas.
- Wear positive pressure clothing that is specifically recommended by the manufacturer.
- Work clothing that becomes wet should be immediately removed due to its flammability hazard.
- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

2) Environmental precautions and protective procedures ○ Atmosphere : Provide local exhaust ventilation system.

- Land : Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Underwater : Prevent entry into waterways, sewers, basements or confined areas.

3) The methods of purification and removal

- Small spill
 - Absorb or cover with sand or other non-combustible material and remove.
 - Transfer to appropriate containers for post-treatment.
 - Use clean non-sparking tools to collect absorbed material.
 - All equipment used when handling the product must be grounded.
- Large spill
 - Make an embankment for further processing.
 - Remove all sources of ignition.
 - Keep unauthorized personnel away.
 - When spilled over limited quantities, inform central government and local self-government.

7 . Handling and storage

1) Precautions for safe handling

- DO NOT eat, drink or smoke in product area.
- Ventilate entire areas or by local ventilation system.
- Wash thoroughly after handling.
- Wear suitable and approved protective equipment.
- Avoid contact with skin, eyes and cloths.
- Do not breathe gas/fumes/ vapour/spray.
- Obtain special instructions before use.
- Do not handle until safety precautions have been read and understood. -Keep away from waterways and sewers.

2) Conditions for safe storage -Store locked up.

- DO NOT eat, drink or smoke in product area.
- U.S OSHA 29 CFR 1910. 106. All equipment used when handling the product must be grounded.
- Keep away from incompatible materials.
- Store and handle in accordance with all current regulations and standards.
- Keep away form acid anhydrides, acid chlorides, oxidants, food and feedstuffs.

8 . Exposure controls/personal protection

1) Occupational Exposure limits

- KOREA TWA : 200ppm (480mg/m³) STEL 400ppm (980mg/ m³)
- OSHA PEL 8hr-TWA 400 ppm (980 mg/m³) STEL 500 ppm (1225 mg/m³)
- Vacated 1993 OSHA STEL 500 ppm (1230 mg/m³)
- ACGIH TWA 200 ppm STEL 400 ppm

- NIOSH recommended exposure limit 10hr TWA 400 ppm (980 mg/m³) STEL 500 ppm (1225 mg/m³)
- Japan TWA 400 ppm
- DFG MAK 500 mg/ m³ (200 ml/m³)
- Biological Exposure Index: Not available

2) Appropriate engineering controls

- Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value.
- Provide blaster resistance equipment at ventilation system if when explosive risk.
- Check legal suitability of exposure level.

8 . Exposure controls/personal protection

3) Personal protective equipment

○ Respiratory protection

Respirator Recommendations NIOSH/OSHA :

- Any supplied-air respirator operated in a continuous-flow mode
- Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
- Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or backmounted organic vapor canister
- Any powered, air-purifying respirator with organic vapor cartridge(s)
- Any self-contained breathing apparatus with a full facepiece
- Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

- Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
- Any supplied-air respirator that has a full facepiece

Escape: Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

○ Eye protection

- Further eye protection such as chemical goggles and/or protecting glasses must be worn when the possibility exists for eye contact due to splashing or spraying liquid or airborne particle.
- An eye wash unit and safety shower station should be available nearby work place.

○ Hand protection

- Wear appropriate protective chemical-resistant gloves.
- Wear appropriate protective chemical-resistant clothing.

9 . Physical and chemical properties

1) Appearance	Physical state : Liquid Color : Colorless
2) Odor	the odor of rubbing alcohol
3) Threshold of odor	22ppm
4) pH	Not available
5) Melting point/freezing point	-90 °C
6) Initial boiling point and boiling point	176-181F (80-83 °C)
7) Flash point	11.7 °C
8) Evaporation rate	1.7
9) Flammability	Flammable liquid

10) Upper/lower flammability or explosive Limits.	Upper exp. Limit: 12.0% Lower exp. Limit: 2.0%
11) vapour pressure	4.4 kPa at 20°C
12) Solubility(ies)	1000g/L at 25°C
13) vapour density	2.1
14) Specific gravity	0.79
15) n-octanol/water partition coefficient	LogKow=0.05 at 25°C
16) Auto ignition temperature	456 °C
17) Degradation temperature	not available
18) Viscosity	2.1 Cp @ 25°C
19) Molecular weight	60.01

10 . Stability and reactivity

- 1) Chemical stability
 - Stable under normal temperatures and pressures
- 2) Possibility of hazardous reactions
 - Contact with metals may evolve flammable hydrogen gas.
- 3) Conditions to avoid
 - Put away from water supply and sewage.
 - Avoid heat, sparks, open flames, or other sources of ignition.

-Containers may explode or ignite when contact with combustible materials.

4) Incompatibles & Reactivities

-Strong oxidizers, acetaldehyde, chlorine, ethylene oxide, acids, isocyanates

5) Hazardous decomposition product

-Thermal decomposition product : Other decomposed products

11 . Toxicological information

1) Information on the likely routes of exposure

- Inhalation: May cause respiratory nasal, and bronchus irritation.
- Oral: Short-term exposure: Specific effects were not observed by oral exposure.
- Skin/eye contact: May cause eye and skin irritation

2) Symptoms related to the physical, chemical and toxicological characteristics

- Flammable liquid: Category 2
- explosives, water reactive substances, self-reactive substances, organic peroxides : not applicable (no chemical groups associated with their properties present in the molecule)
- Refer to "5) Acute and delayed symptoms/effects" of "4.First aid measures"

11 . Toxicological information

3) Delay by short term and long term exposures, acute and chronic effect

- Acute toxicity - Oral : Not classified LD50=5280 mg/kg bw (Rat)
 - Dermal : Not classified LD50=12870 mg/kg bw (Rabbit)
 - Inhalation : Not classified LC50=72.6mg/l (Rat)
- Skin Corrosion/ Irritation: Not classified
 - There are reports of no irritation and of mild irritation in the tests for human and rabbit skin irritation.
 - But from the report that irritation was not indicated in the test which was done skin application for the medical treatment of the volunteer and an alcoholism patient in the humans
- Serious Eye Damage/ Irritation: Category 2A
 - Slight to severe ocular irritant property in the eye irritation tests with the rabbits
- Respiratory sensitizer: Not available
- Skin Sensitization: Not classified
 - It was negative for skin sensitization test by the Buehler method in the guinea pig in SIDS

Carcinogenicity : Not classified

- Classified into a group 3 in IARC and A4 in ACGIH

Mutagenicity : Not classified In vitro- Ames test:

Negative sister chromatid exchange assay:

Negative

In vivo- micronucleus test which used the mouse bone marrow cells: Negative

Reproductive toxicity : Not classified

NOEL Parental < 500 mg/kg bw/day. NOEL F1, F2 = 400 mg/kg bw/day

- The only reproductive parameter apparently affected by isopropanol exposure was a statistically significant decrease in male mating index of the F1 males. Male and female fertility, and female fecundity indices of rats dosed with isopropanol were not different from those of controls by statistical analysis and were within, or relatively close to, historical control values. In the developmental toxicity in rats via oral gavage, no exposure-related effects were noted on motor activity, weights of the four regions of the brain, developmental landmarks, or morphological changes to the tissues of the central nervous tissue.

Specific target organ toxicity (single exposure) : Category 3 (respiratory tract irritation, narcotic effect)

- The principal manifestation of acute isopropyl is central nervous system depression. Symptoms and signs; persistent nausea, vomiting, abdominal pain, refractory and depressed respirations. Moreover, irritation to noses and throats in humans is confirmed and judged that there was respiratory irritant.

Specific target organ toxicity (repeat exposure): Not classified

- The systemic (non-cancer) toxicity of repeated exposure to isopropanol has been evaluated in rats and mice by the inhalation and oral routes. Rats exhibited an accumulation in hyaline (protein) droplets in kidney proximal tubule cells minimal to mild effects to the kidney including renal tubular proteinosis and tubular dilation were observed.

Aspiration hazard: Not available

12 . Ecological information

1) Aquatic Ecotoxicity

-Acute toxicity: Not classified

-Chronic toxicity: Not classified

Fish : 96hr-LC₅₀(Pimephales promelas) = 9640mg/L

Crustacea: : 48hr-EC₅₀(Daphnia magna) >10000 mg/l

Algae : Not available

2) Persistence and degradability

- Persistence : Low persistency (Log Kow of all ingredients are less than 4) (Log Kow =0.05)
- Degradability :
 - Hydrolysis, Photolysis: Not expected due to physical chemical characteristic.
 - Atmosphere: degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life in air is estimated to be 3.2 days.

3) Bioaccumulative potential

- The material may not expect bioaccumulation
- Biodegradation : Readily biodegradation , BOD5=49%
- Bioaccumulation : Biodconcentration Factor (BCF) = 1

4) Mobility in soil

- Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 8.10×10^{-6} atm-cu m/mole. Isopropanol may volatilize from dry soil surfaces based upon its vapor pressure.

13 . Disposal considerations

1) Disposal method

- Incinerate the waste.
- Dispose of material container in accordance with waste treatment management regulation.

2) Disposal precaution

- Consider the require attention in accordance with waste treatment management regulation (U.S. EPA 40 CFR 262. Hazard Waste No: D001, D002, D003, U 008).

14 . Transport information

1) UN Number : UN 1219

2) UN Proper shipping name : ISOPROPYL ALCOHOL

3) Transport Hazard class : Class 3

4) Packing group : II

5) Marine pollutant : Not listed

6) Special safety response for transportation or transportation measure

- Emergency schedule for fire : F-E
- Emergency schedule for spillage : S-D

15 . Regulatory information

Occupational Safety and Health Regulation : Listed in Occupational exposure assessment, hazardous agent, Occupational exposure limits, Health examination agent. - Toxic Chemical Control Act. : Not listed

- Dangerous Material Safety Management Regulation : Petroleum, class 4-1
- Waste Control Act : Public Controlled Waste (Waste organic solvent without halogens)

○ EU Classification

- Classification: F; R11 Xi; R36 R67
- Risk phrases : R11, R36, R67
- Safety phrases : S2, S7, S16, S24/25, S26

○ U.S.A. management information

- OSHA regulation (29 CFR1910.119) : Not listed
- CERCLA 103 regulation (40 CFR302.4) : Not listed
- EPCRA 302 regulation (40 CFR355.30) : Not listed
- EPCRA 304 regulation (40 CFR355.40) : Not listed
- SARA 313 regulation (40 CFR372.65) : listed

○ Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade : Not listed

○ Stockholm Convention on Persistent Organic Pollutants (POPs) : Not listed

○ Mont- real Protocol on Substances that Delete the Ozone Layer : Not listed