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1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

- 1) Product identifier: IPA (Isopropyl alcohol)
- 2) Relevant identified uses of the substance or mixture and uses advised against:
 - Relevant identified uses: Cleaning/washing agents, Solvents
 - Uses advised against: No data available
- 3) Manufacture/Supplier/Distributor information:
 - Manufacture information:
 - Company name: ISU CHEMICAL CO., LTD
 - Address: 8, Seokdang-gil, Onsan-eup, Ulju-gun, Ulsan, Korea
 - Emergency telephone number: Tel. 052-231-5581

2. HAZARD IDENTIFICATION

- 1) Hazard classification: Flammable Liquids Cat.2
 Serious eye damage/eye irritation Cat.2
 Specific Target Organ Toxicity Single Exposure Cat.3
 Aspiration Hazard Cat.2
- 2) Allocation label elements including precautionary statements
 - Hazard pictograms:




 - Signal word: Danger
 - Hazard statements
 - H225: Highly Flammable liquid and vapour.
 - H305: May be fatal if swallowed and enters airways.
 - H319: Causes serious eye irritation.
 - H336: May cause drowsiness or dizziness.
 - Precautionary statements
 - Prevention:
 - 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.
 - P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
 - P264: Wash ... thoroughly after handling.
 - P271: Use only outdoors or in a well-ventilated area.
 - P280: Wear protective gloves/protective clothing/eye protection/face protection.

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- Response:
 - P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 - 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
 - P312: Call a POISON CENTER or doctor/physician you feel unwell.
 - P331: Do not induce vomiting.
 - P337+P313: If eye irritation persists: Get medical advice/attention.
 - P370+P378: In case of fire: Use ... 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.
 - Disposal:
 - P501: Dispose of contents/container to (in accordance with local/regional/national/International regulations.)
- 3) Other hazards:
- NFPA Grade: Health 1, Flammability 3, Reactivity 0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	Common name	CAS No.	Concentration(wt%)
2-Propanol	Propan-2-ol	67-63-0	100

4. FIRST AID MEASURES

- 1) Following eye contact:
 - 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.
- 2) Following skin contact:
 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
 - Call 911 or 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

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least 20 minutes.

- Wash skin with soap and water.

3) Following inhalation:

- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.

4) Following ingestion:

- Potential for aspiration if swallowed.
- Get medical aid immediately.
- Do not induce vomiting unless directed to do so by medical personnel.
- Never give anything by mouth to an unconscious person.
- If vomiting occurs naturally, have victim lean forward.

5) Advice to physician:

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

5. FIRE FIGHTING MEASURES

1) 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.

2) Special hazards arising from the substance or mixture:

- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
- Highly Flammable liquid and vapour.
- Violent reaction may cause fire and explosion.
- Containers may explode when heated.
- Runoff may create fire or explosion hazard.
- Vapor explosion hazard indoors, outdoors or in sewers.

3) Special protective equipment for firefighters:

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks: Do not spray directly exposure and safety equipment because of freezing.
- 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.

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- 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

- 1) Health considerations and protective equipment:
 - Do not breathe dust/fume/gas/mist/vapours/spray.
 - Remove all ignition sources because microscopic particles can cause fire or explosion.
 - Clean up spills immediately, observing precautions in Protective Equipment section.
 - Do not touch or walk through spilled material.
 - ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
 - All equipment used when handling the product must be grounded.
 - Stop leak if you can do it without risk.
 - Please note that materials and conditions to be avoided.
- 2) Environmental precautions:
 - Runoff may cause pollution.
 - Prevent entry into waterways, sewers, basements of confined areas.
- 3) For cleaning up:
 - Build a dike and collect the water for the fire extinguishing.
 - Absorb spill 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

- 1) Precautions for safe handling:
 - Do not expose the ignition source, heat, static electricity.
 - Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
 - Please note that materials and conditions to be avoided.
 - Handling refer to engineering control/personal protection section.
 - Loosen closure cautiously before opening.
 - Use care in handling/storage.
 - All equipment used when handling the product must be grounded.
 - Avoid breathing dust/fume/gas/mist/vapors/spray.
 - Use only outdoors or in a well-ventilated area.
- 2) Conditions for safe storage (including any incompatibilities):
 - Empty drums should be completely drained, properly bunged, and promptly returned to the drum reconditioners or properly placed.

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- Please note that materials and conditions to be avoided.
- Avoid Ignition source(heat, spark, flame)
- Store in a dry place. Store in a closed container.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Chemical exposure limits, Biological exposure standard:

Components	Occupational exposure limits (Domestic)	ACGIH	Biological limit values
2-Propanol	TWA – 200ppm, 480mg/m ³ STEL – 400ppm, 980mg/m ³	TWA – 200ppm, STEL – 400ppm	No data available

2) Appropriate engineering controls:

- Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

3) Personal protection equipment

○ Respiratory protection:

- Under conditions of frequent use or heavy exposure, respiratory protection may be needed.
- Wear breathing protection, which needs a confirmation from the Korea Occupational Safety and Health Agency.

○ Eye protection:

- Wear suitable protective goggles and face shields..
- Provide emergency showers and eyewash.

○ Hand protection:

- Wear suitable protective gloves.

○ Body protection:

- Wear suitable protective clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

1) Appearance(Physical state, color, etc): Clear colorless liquid

2) Odor: Alcohol-like odor

3) Odor threshold: No data available

4) pH: Not applicable

5) Melting point/freezing point: -89.5°C

6) Initial boiling point and boiling range: 82.3°C

7) Flash point: 8-18°C

8) Evaporation rate: No data available

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- 9) Flammability(solid, gas): Not applicable
 10) Upper/lower flammability or explosive limits: Lower explosion limit – 2%,
 Upper explosion limit – 13%
 11) Vapour pressure: 60.2 at 25 °C
 12) Solubility(ies): Miscible
 13) Vapour density: 2.1 (Air=1)
 14) Relative density: 0.78509 at 25 °C
 15) n-octanol/water partition coefficient: 0.05 at 25 °C
 16) Auto ignition temperature: 399 °C
 17) Decomposition temperature: No data available
 18) Viscosity: 2.038mPa.s at 25 °C
 19) Molecular weight(mass): 60.095

10. STABILITY AND REACTIVITY

- 1) Stability and hazardous reactivity:
- Explosive mixture may be formed in flash point or more.
 - Flammable liquid and vapour
 - Violent reaction may cause fire and explosion.
 - Containers may explode when heated.
 - Runoff may create fire or explosion hazard.
 - HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames
 - Fire may produce irritating, corrosive and/or toxic gases.
- 2) Conditions to avoid:
- Ignition source(heat, spark, flame)
- 3) Incompatible materials:
- No data available
- 4) Hazardous decomposition products:
- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

11. TOXICOLOGICAL INFORMATION

- 1) Exposure route information
- No data available
- 2) Health hazard information
- Acute toxicity:
 - Oral: LD50 = 5840mg/kg (Rat)
 - Dermal: LD50 = 12870mg/kg
 - Inhalation(Gas): No data available
 - Inhalation(Vapor): LC50 > 10000 ppm/6h

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- Inhalation(Dust, mist): No data available
- Skin corrosion/Irritation:
 - Not irritating (Rabbit)
- Serious eye damage/irritation:
 - Serious irritating (Rabbit)
- Respiratory sensitization:
 - No data available
- Skin sensitization:
 - Not sensitising (Guinea pig)
- Carcinogenicity:
 - IARC Group 3
- Germ cell mutagenicity:
 - In vivo – *Mouse*: Negative (Micronucleus assay, OECD TG 474, GLP)
 - In vitro – *Salmonella typhimurium*: Negative (Ames test, OECD TG 471, Metabolic activation: with and without)
 - *Chinese hamster Ovary Cell*: Negative (Mammalian cell gene mutation assay, OECD TG 476, GLP)
- Reproductive toxicity:
 - Severe malformation in the F1 generation associated with exposure was not observed. (Rat, OECD TG 415, GLP)
- Specific target organ toxicity (single exposure):
 - Prostration, severe failure of muscular coordination, reduced arousal, slow or unnatural breathing, hypothermia and loss of reflexes are observed in group exposed in the concentration of 100ppm.(Rat, OECD TG 403, GLP)
- Specific target organ toxicity (repeated exposure):
 - There is no damage due to exposure to backbone and peripheral nervous system of rats. (Rat, OECD TG 413, GLP)
- Aspiration hazard:
 - Aspiration pneumonia: generally kidney and liver dysfunction can be observed temporarily, cause serious kidney disorder. (Human)

12. ECOLOGICAL INFORMATION

- 1) Aquatic toxicity:
 - Fish: LC50= 10000 mg/L (*Pimephales promelas*, OECD TG 203, GLP, 96h)
 - Crustacean: LC50> 10000 mg/L (*Daphnia magna*, OECD TG 202, GLP, 24h)
- 2) Persistence and degradation: log Kow= 0.05 (Calculated),
BOD=86%(14d, OECD TG 301 F, GLP)
- 3) Bioaccumulative potential: BCF= 3(Calculated)
- 4) Mobility in soil: Koc= 1.5(Calculated)
- 5) Other adverse effects: No data available

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13. DISPOSAL CONSIDERATIONS

- 1) Disposal methods:
 - Dispose of contents/container to the waste control act.
- 2) Precautions (including disposal of contaminated container or package):
 - Regulations precautions indicated in Waste Management Act should be considered.

14. TRANSPORT INFORMATION

- 1) UN No.: UN 1219
- 2) Proper shipping name: ISOPROPANOL(Isopropyl alcohol)
- 3) Class or division: Class 3
- 4) Packing group: II
- 5) Marine pollutant: Not listed
- 6) Special safety response for transportation or transportation measure:
 - Emergency measures in case of fire : F-E
 - Emergency measures in the effluent : S-D

15. REGULATORY INFORMATION

- 1) Occupational Safety and Health Act in Korea:
 - Work environment monitoring substance(measurement period:6month)
 - Substance for administration
 - Special medical examination substance(examination period:12month)
 - Exposure standard established
- 2) Chemicals Control Act in Korea: Not applicable
- 3) Safety Control of Dangerous Substances Act in Korea: Class 4 alcohol 400ℓ
- 4) Wastes Control Act in Korea: Designated waste
- 5) Other regulations in KOREA and Abroad regulations:
 - Other regulation (Domestic):
 - Persistent Organic Pollutants (POPs) Control Act: Not applicable
 - National regulations:
 - U.S.A. management information(OSHA regulation): Not applicable
 - U.S.A. management information(CERCLA regulation): Not applicable
 - U.S.A. management information(EPCRA 302 regulation): Not applicable
 - U.S.A. management information(EPCRA 304 regulation): Not applicable
 - U.S.A. management information(EPCRA 313 regulation): Not applicable
 - U.S.A. management information(Rotterdam Convention on Substances): Not applicable
 - U.S.A. management information(Stockholm Convention on Substances): Not applicable
 - U.S.A. management information(Montreal Protocol on Substances): Not applicable

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- EU Classification (Classification): F; R11 Xi; R36 R67
- EU Classification (Risk Phrases): R11, R36, R67
- EU Classification (Safety Phrases): S2, S7, S16, S24, S25, S26

16. OTHER INFORMATION

1) Reference:

- Korea Occupational Safety & Health Agency MSDS
- OECD SIDS
- ChemWATCH
- IUCLID
- HSDB
- IARC
- ECOTOX
- NITE
- Recommendations on the transport of dangerous goods
- NCIS
- Emergency response guide book
- ECOSAR
- QSAR
- EU RAR
- The Chemical Database
- ICSC
- RTECS
- NIOSH Pocket guide
- ESIS
- ECHA CHEM
- HPVIS

2) Print date: 2015. 10. 01

3) Number of revised/Date of last revision:

4) Other: