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

- 1) Product identifier: D-SOL 240
- 2) Relevant identified uses of the substance or mixture and uses advised against:
 - Relevant identified uses: Solvents, cleaning and cleaning agents
 - 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. +82 52 231 5587 Fax. +82 52 231 5699

2. HAZARD IDENTIFICATION

- 1) Hazard classification: Aspiration hazard Cat.1
 Chronic Aquatic Environmental Harmfulness Cat.2
 Skin irritation Cat.2
 Specific target organ toxicity-single exposure Cat.3
- 2) Allocation label elements including precautionary statements
 - Hazard pictograms




 - Signal word
 - Danger
 - Hazard statements
 - H304 : May be fatal if swallowed and enters airways.
 - H315 : Causes skin irritation
 - H336 : May cause drowsiness or dizziness
 - H411: toxic to aquatic organisms by long-term effects
 - Precautionary statements
 - Prevention
 - P261 : Avoid breathing dust/fumes/gas/mist/vapours/spray
 - P264 : Wash handling area thoroughly after handling.
 - P271 : Use only outdoors or in a well-ventilated area.
 - P273 : Do not discharge into the environment.
 - P280 : Wear protective gloves/protective clothing/eye protection/face protection.
 - Response
 - P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 - P302+P352 : IF ON SKIN: Wash with plenty of water
 - P304+P340 : IF INHALED: Remove person to fresh air and keep comfortable for

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<p>breathing.</p> <ul style="list-style-type: none"> · P312 : Call a POISON CENTER/ doctor if you feel unwell. · P321 : Specific treatment · P331: Do not induce vomiting. · P332+P313 : If skin irritation occurs: Get medical advice/attention. · P362+P364 : Take off contaminated clothing and wash it before reuse. · P391: Collect the leak. - Storage · P403 : · P405: Store locked up. - Disposal · P501: Dispose of contents/container to (in accordance with local/regional/national/ International regulations.) <p>3) Other hazards: NFPA Grade: Health 1, Flammability 1, Reactivity 1</p>

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	Common name	CAS No.	Concentration (wt%)
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	Hydrotreated kerosene, Distillate fuel oils, light	CAS No. 64742-47-8 EC No. 265-149-8	100

4. FIRST AID MEASURES

<p>1) Following eye contact:</p> <ul style="list-style-type: none"> - Flush eyes gently with water for at least 20 minutes while holding eyelids apart - Seek medical attention without delay; if pain persists or recurs seek medical attention. <p>2) Following skin contact:</p> <ul style="list-style-type: none"> - Immediately flush skin with plenty of soap and water for at least 20 minutes while removing contaminated clothing and shoes. - In case of burns, immediately cool affected skin for as long as possible with cold water. - Seek medical attention in event of irritation. <p>3) Following inhalation:</p> <ul style="list-style-type: none"> - Remove from exposure to fresh air immediately. - Lay patient down. Keep warm and rested. - If not breathing, give artificial respiration. - If breathing is difficult, give oxygen. - Perform CPR if necessary. - Get medical attention immediately. <p>4) Following ingestion:</p> <ul style="list-style-type: none"> - If swallowed do NOT induce vomiting.

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- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Possible aspiration hazard.
- Get medical aid immediately

5) Advice to physician:

- Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

5. FIRE FIGHTING MEASURES

1) Suitable (and unsuitable) extinguishing media:


- Small fires: dry chemical, carbon dioxide, alcohol-resistant foam.
- Large fires: dry chemical, carbon dioxide, alcohol-resistant foam, water spray.
- Unsuitable extinguishing media: High-pressure injection

2) Special hazards arising from the substance or mixture:

- Vapour forms an explosive mixture with air.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

3) Special protective equipment for firefighters:

- Wear a self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment.
- Prevent, by any means available, spillage from entering drains or water course.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Dig a ditch to dispose of the firewater and lock it up and keep the material from dispersing.
- Leakage may cause contamination.
- In case of tank fire, cool the container with plenty of water even after extinguishing.
- In case of tank fire, withdraw immediately if there is a high-pitched sound from the

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- pressure release device or if the tank discolors.
- In the event of a tank fire, withdraw from the tank engulfed in flames.

6. ACCIDENTAL RELEASE MEASURES

- 1) Health considerations and protective equipment:
 - Avoid breathing vapours and contact with skin and eyes.
 - Remove all ignition sources.(No smoking, naked lights.)
 - Control personal contact by using protective equipment.
 - Alert Fire Brigade and tell them location and nature of hazard.
 - Wear breathing apparatus plus protective gloves.
 - Cover with plastic sheet to prevent spread.
 - Increase ventilation.
 - Use a spark-proof tool.
- 2) Environmental precautions:
 - Spillage from entering drains or water course.
 - If contamination of drains or waterways occurs, advise emergency services.
- 3) For cleaning up:
 - Clean up all spills immediately.
 - Contain and absorb spill with inert material (e.g. vermiculite, sand or earth)
 - Collect residues in a flammable waste container.
 - Water spray or fog may be used to disperse /absorb vapour.
 - Collect recoverable product into labelled containers for recycling.
 - Collect solid residues and seal in labelled drums for disposal.
 - Dike far ahead of liquid spill for later disposal.
 - Collect the leaks.

7. HANDLING AND STORAGE

- 1) Precautions for safe handling:
 - Avoid working in spray mist.
 - When using do not eat, drink or smoke.
 - Always wash hands with soap and water after handling.
 - DO NOT allow clothing wet with material to stay in contact with skin.
 - Avoid contact with eyes, skin, and clothing.
 - Containers, even those that have been emptied, may contain explosive vapours.
 - Keep container tightly closed.
 - Use spark-free tools when handling.
 - Work with reference to engineering management and personal protective equipment.
 - Use only in well ventilated areas.
 - Be careful of the high temperature.

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- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
 - Use spark-free tools when handling.
- 2) Conditions for safe storage (including any incompatibilities):
- Keep away from sources of ignition and strong oxidising agents and acids.
 - Store in a cool, dry, well-ventilated area away from incompatible substances.
 - Store in original containers in approved flammable liquid storage area.
 - Store in a tightly closed container.
 - Containers containing residue (liquid and/or vapor) can be hazardous.
 - Drain the empty drum completely and cover it properly and immediately return it to the drum regulator or place it properly.
 - Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances.
 - Have appropriate extinguishing capability in storage area and flammable gas detectors.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Chemical exposure limits, Biological exposure standard:

Components	Occupational exposure limits (Domestic)	ACGIH	Biological limit values
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	TWA=0.8 mg/m ³ (Only for metal processing oil)	No data available	No data available


2) Appropriate engineering controls:

- Install a local exhaust system, etc., and manage to maintain the appropriate control wind speed.
- Ventilation equipment should be explosion-resistant.
- Where exposure may occur, engineering controls, rather than the provision of Personal Protective Equipment (PPE) should be employed.
- Facilities that store or use this substance should be equipped with a washing facility and a safety shower.

3) Personal protection equipment:

○ Respiratory protection:

- Wear respiratory protection which is appropriate to exposed gas/liquid physical and chemical properties authenticated by Korea Occupational Safety & Health Agency.
- Wear half-face respirator supplied with appropriate filters or cartridge(s) when exposure concentration is lower than 2000mg/m³.
- Wear loose-fitting hood/helmet style electromotive respirator or continuous-flow dustproof mask supplied with appropriate filters or cartridge(s) when exposure concentration is lower than 5000mg/m³


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- Wear full-face or electromotive half-face or air continuous-flow/pressure-demand half-face respirator supplied with appropriate filters or cartridge(s) – when exposure concentration is lower than 10000mg/m³.
- Wear full-face or helmet/hood type or demanded-pressure breathing respirator supplied with appropriate filters or cartridge(s) when exposure concentration is lower than 200000mg/m³.
- Wear self-contained breathing apparatus(SCBA) or pressure-demanded self-contained breathing apparatus(SCBA) respiratory protection supplied with appropriate filters or cartridge(s) when exposure concentration is lower than 2000000mg/m³.
- Eye protection:
 - Use chemical splash goggles and face shield.
 - Some plastic personal protective equipment (PPE) are not recommended as they may produce static electricity.
 - Provide emergency showers and eyewash near work place.
- Hand protection:
 - Wear suitable protective gloves.
- Body protection:
 - Wear suitable protective clothing.
 - PVC protective suit may be required if exposure severe.

9. PHYSICAL AND CHEMICAL PROPERTIES

- 1) Appearance(Physical state, color, etc): Low viscosity liquid
- 2) Oder: Characteristic odour
- 3) Oder threshold: No data available
- 4) pH: Not applicable
- 5) Melting point/freezing point: -49℃ at 101.325kPa
- 6) Initial boiling point and boiling range: 240 ~ 262℃
- 7) Flash point: 107℃
- 8) Evaporation rate: No data available
- 9) Flammability(solid, gas): Not applicable
- 10) Upper/lower flammability or explosive limits: Lower explosion limit – 1%,
Upper explosion limit – 6%
- 11) Vapour pressure: 1 – 3.7kPa at 37.8℃
- 12) Solubility(ies): 29 – 142.1 mg/L at 25℃ (Estimated)
- 13) Vapour density: 4.5 (Air=1)
- 14) Relative density: 0.75–0.85 @ 20℃
- 15) n-octanol/water partition coefficient: 3.3 – 5.4 (Calculated)
- 16) Auto ignition temperature: 220 – 250℃ at 101.325kPa
- 17) Decomposition temperature: No data available
- 18) Viscosity: 1.0 – 2.4 cSt at 40℃

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19) Molecular weight(mass): No data available

10. STABILITY AND REACTIVITY

1) Stability and hazardous reactivity:

- Stable under normal temperatures and pressures.
- Can form explosive mixture at flash point or above.
- May produce irritating and toxic gases in case of fire.
- Container may explode when heated.
- Some liquids may produce vapors that cause dizziness and suffocation.

2) Conditions to avoid:

- All ignition sources (heat, sparks or flames)

3) Incompatible materials:

- Avoid reaction with oxidising agents.

4) Hazardous decomposition products:

- Oxides of carbon.

11. TOXICOLOGICAL INFORMATION

1) Exposure route information

- The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

2) Health hazard information

○ Acute toxicity:

- Oral: LD50 > 5,000 mg/kg (Rat, OECD TG 420, GLP, 14D)
- Eye/Skin: LD50 > 2,000 mg/kg (Rabbit, OECD TG 402, GLP, 14D)
- Inhalation (gas): No data available
- Inhalation (vapour): LC50 > 5.28mg/L, No Death (Rat, OECD TG 403, GLP, 4H)
- Inhalation (mist): LC50 > 5.2mg/L, No Death (Rat, IUCLID, 4H)

○ Skin corrosion/Irritation: (Cat. 2)

- irritating (Rabbit)
- erythema score: 2.67 points, edema score: 2.58 points (API, 1985)

○ Serious eye damage/irritation:

- Non-irritating (Rabbit, GLP)

○ Respiratory sensitization:


- No data available

○ Skin sensitization:

- Not sensitizing (Mouse, Kanikkannan, 2000)

○ Carcinogenicity:

- The mechanism of occurrence of tumors observed, such as being evaluated as non-genotoxic in genotoxicity tests, is considered a non-genotoxic mechanism, and there is

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not enough evidence to classify them as carcinogenic substances.

(Exxon Biomedical Sciences Inc,1996)

○ Germ cell mutagenicity:

• In vitro

– Mammalian Cell Gene Mutation Test (OECD Guideline 476, API 1985)

: Negative

– OECD Guideline 479 (Genetic Toxicology: In Vitro Sister Chromatid Exchange Assay in Mammalian Cells): Negative

– OECD Guideline 471 (Bacterial Reverse Mutation Assay, S. typhimurium TA98)

: Negative

○ Reproductive toxicity:

– OECD Guideline 414 (Prenatal Developmental Toxicity Study): No major toxic effects (Maternal NOAEL 500 mg/kg bw/day, development NOAEL 1000 mg/kg bw/day)

– OECD Guideline 416 (Two-Generation Reproduction Toxicity Study): No major toxic effects (Maternal NOAEL 750 mg/kg bw/day, Reproduction NOAEL ≥ 1500 mg/kg bw/day)

○ Specific target organ toxicity (single exposure): Cat. 3 (Anaesthetic effect)

– Symptoms such as decreased activity and ataxia were observed in a number of acute toxicity tests.

○ Specific target organ toxicity (repeated exposure):

– No effects related to clinical symptoms and mortality were observed in either gender, and no effects were observed as a result of measuring hematology, clinical chemistry and urinary tests in females. (Rat, GLP)

○ Aspiration hazard: (Cat. 1)

– Kinematic viscosity: about 1 ~ 2.4 cSt (at 40°C)

12. ECOLOGICAL INFORMATION

1) Aquatic toxicity:

– Fish : LL50 ≥ 2~5 mg/L (Oncorhynchus mykiss, OECD TG 203, GLP, 96H)

– Crustaceans : EL50 = 1.4 mg/L (Daphnia magna, OECD TG 202, GLP, 48H)

– Algae : EL50 ≥ 1 mg/L (Pseudokirchnerella subcapitata, OECD TG 201, GLP, 72H)

2) Persistence and Degradation:

– Degradation : 58.6% (28D, OECD TG 301 F, GLP)

– Persistence : Log Pow : 1.99E+00 ~ 1.80E+01 (KOWWIN v1.68)


Log Kow : 4.69 (PETRORISK v7.04)

3) Bioaccumulative potential: 0.4 ~ 19200 L/kg (BCFBAF v3.01)

4) Mobility in soil: Log Koc : 1.71 ~ 14.70 (EUSES v3.0)

Log Koc : 10.05 (PETRORISK v7.04)

5) Other adverse effects: No data available

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13. DISPOSAL CONSIDERATIONS


- 1) Disposal methods:
 - Incinerate separated oil from oil and water, and treat the remaining water after separating at the water pollution control facilities.
 - Incinerate or stabilize residue treated by evaporation•concentration.
 - Incinerate residue treated by agglomeration•precipitation.
 - Refine by Separation•distillation•extraction•filtration•pyrolysis.
 - Incinerate or stabilize residue.
- 2) Precautions (including disposal of contaminated container of package):
 - Regulations precautions indicated in Waste Management Act should be considered.

14. TRANSPORT INFORMATION

- 1) UN No.: 1223
- 2) Proper shipping name: KEROSENE
- 3) Class or division: 3
- 4) Packing group: III
- 5) Marine pollutant: Applicable
- 6) Special safety response for transportation or transportation measure:
 - Emergency measure on fire: F-E
 - Emergency measure for leaking: S-E

15. REGULATORY INFORMATION

- 1) Occupational Safety and Health Act in Korea:
 - Exposure criteria setting substance: Applicable(Only for metal processing oil)
 - Substances subject to work environment measurement: Applicable
(Measurement period: every 6 months) (Only for metal processing oil)
 - Substances subject to special health examination: Applicable
(Diagnostic cycle: every 12 months) (Only for metal processing oil)
- 2) Chemicals Control Act in Korea: Not applicable
- 3) Safety Control of Dangerous Substances Act in Korea: Class 4 Third Petroleum liquids
- 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

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- 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
- EU Classification (Classification): Asp. Cat. 1; R65
- EU Classification (Risk Phrases): R65
- EU Classification (Safety Phrases): S2, S23, S24, S62

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
- HPVIS
- ECHA CHEM

2) Date of initial completion: 1996. 06. 28

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4) Other: No data available