	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	1/9

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


- 1) Product identifier: ISU Lion 110
- 2) Relevant identified uses of the substance or mixture and uses advised against:
 - Relevant identified uses: Drilling Base Fluid
 - 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. +82-52-231-5581 Fax. +82-52-231-5566

2. HAZARD IDENTIFICATION

- 1) Hazard classification: Aspiration hazard: Cat.1
- 2) Allocation label elements including precautionary statements
 - Hazard pictograms
 - Signal word
 - Danger
 - Hazard statements
 - H304: May be fatal if swallowed and enters airways.
 - Precautionary statements
 - Response
 - P301+P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
 - P331: Do not induce vomiting.
 - Storage
 - P405: Store locked up.
 - Disposal
 - P501: Dispose of contents/container to.
- 3) Other hazards:
 - NFPA Grade: Health 1, Flammability 0, Reactivity 0

3. COMPOSITION/INFORMATION ON INGREDIENTS


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

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	2/9

4. FIRST AID MEASURES

- 1) Following eye contact:
 - Flush eyes gently with water for at least 15 minutes while holding eyelids apart
 - Seek medical attention without delay; if pain persists or recurs seek medical attention.
 - If symptoms develop, immediately move individual away from exposure and into fresh air.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
- 2) Following skin contact:
 - Immediately flush skin with plenty of soap and water for at least 15 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.
- 3) Following inhalation:
 - 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.
- 4) Following ingestion:
 - If swallowed do NOT induce vomiting..
 - 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

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	3/9

- 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.
- 2) Special hazards arising from the substance or mixture:
 - Liquid and vapour are flammable.
 - 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.

6. ACCIDENTAL RELEASE MEASURES

- 1) Health considerations and protective equipment:
 - Avoid breathing vapours and contact with skin and eyes.
 - Control personal contact by using protective equipment.
 - Alert Fire Brigade and tell them location and nature of hazard.
 - Wear breathing apparatus plus protective gloves.
 - No smoking, naked lights or ignition sources.
 - 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.

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	4/9

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.
- 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.
- 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	No data available	No data available	No data available


2) Appropriate engineering controls:

- Local exhaust ventilation or a process enclosure ventilation system may be required.
- Ventilation equipment should be explosion-resistant.
- Where exposure may occur, engineering controls, rather than the provision of Personal Protective Equipment (PPE) should be employed.

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.

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	5/9

- Wear half-face respirator supplied with appropriate filters or cartridge(s) when exposure concentration is lower than 2,000 mg/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 5,000 mg/m³
- 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 10,000 mg/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 200,000 mg/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 2,000,000 mg/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) Odour: Characteristic odour
- 3) Odour threshold: No data available
- 4) pH: Not applicable
- 5) Melting point/pour point: -50°C at 101.325 kPa
- 6) Freezing point: -70°C at 101.325 kPa (Estimated)
- 7) Initial boiling point and boiling range: 200 ~ 245°C
- 8) Flash point: 75 ~ 85°C
- 9) Evaporation rate: No data available
- 10) Flammability(solid, gas): Not applicable
- 11) Upper/lower flammability or explosive limits: Lower explosion limit 1%,
Upper explosion limit 6%
- 12) Vapour pressure: 1 ~ 3.7 kPa at 37.8°C
- 13) Solubility(ies): 29 ~ 142.1 mg/L at 25°C (Estimated)

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	6/9


- 14) Vapour density: 4.5 (Air=1)
 15) Relative density: 0.75 ~ 0.85 @ 20℃
 16) n-octanol/water partition coefficient: 3.3 ~ 5.4 (Calculated)
 17) Auto ignition temperature: 220 ~ 250℃ at 101.325 kPa
 18) Decomposition temperature: No data available
 19) Viscosity: 1.3 ~ 2.3 cSt at 40℃
 20) Molecular weight(mass): No data available

10. STABILITY AND REACTIVITY

- 1) Stability and hazardous reactivity:
 - Stable under normal temperatures and pressures.
 - Product is considered stable.
 - Hazardous polymerisation will not occur.
- 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
 - Dermal: LD50 > 2,000 mg/kg
 - Inhalation: LC50 > 3 mg/l
- Skin corrosion/Irritation: (Cat. 2)
 - Moderately irritating (Rabbit)
- Serious eye damage/irritation:
 - Slightly irritating (Rabbit)
- Respiratory sensitization:
 - Not sensitizing (Guinea pig)
- Skin sensitization:
 - Not sensitizing (Guinea pig)
- Carcinogenicity:
 - Pyrolysis fuel oil (both water and oil quenched) was carcinogenic in the mouse skin


	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	7/9

painting bioassay.

- Germ cell mutagenicity:
 - In vitro – Ames test (Salmonella typhimurium TA98, TA100, TA1535, TA1537, TA1538) : Negative
 - In vivo – Cytogenetic assay (Rat) : Negative
 - Micronucleus assay (Mouse) : Positive
- Reproductive toxicity:
 - At rat inhalation test, There was no evidence of any adverse compound effect on the dams, nor was there evidence of compound-induced terata, variation in sex ratio, embryotoxicity or inhibition of foetal growth and development.
 - Coal-derived experimental fuel oil administered orally to male and female rats at doses up to 0.5 g/kg for 13 weeks prior to mating did not adversely affect reproductive capacity or performance.
- Specific target organ toxicity (single exposure):
 - A group containing 5 male and 5 female Sprague-Dawley rats was tested at a single dose of 5 g/kg. Administration was by gavage. Main clinical signs were hypoactivity. At necropsy, the only visible finding was kidney distension in one male animal.
- Specific target organ toxicity (repeated exposure):
 - At rats, no treatment-related effects were evident from the haematology, clinical chemistry parameters and organ weight data.
 - Diffuse hepato-cytomegaly was evident in livers from 9/10 high dose and 4/10 low dose rabbits during the 4 wk dosing period.

12. ECOLOGICAL INFORMATION

- 1) Chronic Ecotoxicity:
 - 7-Day EC50 (larval fish growth-US EPA)
 - 28-Day juvenile fish exposure (mugil cephalus-US EPA)
- 2) Acute Ecotoxicity:
 - 10-Day sediment (mud skippers/gobiid fish, mud crab/mangrove crab, estuarine amphipod, estuarine mollusc-OECD 218)
 - 96 hrs LC50 (SPP) (juvenile fish(estuarine/coastal marine), post larvae of tiger shrimp(penaeus monodon)-US EPA, OECD 202, OECD 203)
 - 96 hrs LC50 (SP) (juvenile fish(estuarine/coastal marine), juvenile tiger shrimp-OECD 202, OECD 203)
- 4) Algae Growth Inhibition:
 - EC50 Concentration (skeletonema costatum, isochrysis galbana, Chlorella vulgaris-OECD 201)
- 5) Biodegradation
 - 28-Day Biodegradability (Anaerobic closed bottle-OECD 306, Aerobic-OECD 301)
 - Anaerobic 63% & Aerobic 78%, Readily Biodegradable (Passed > 60%)
- 6) Bioaccumulation/Bioconcentration: PAH Analysis-US EPA / Log POW GC, Log POW

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	8/9

HPLC-US EPA, OECD 305 A-E: 0.000013 wt% (Passed <0.001 wt%)

7) Mobility in soil: No data

8) Other adverse effects: NOEC=1mg/L

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):

- Dispose of contents/container to ...

14. TRANSPORT INFORMATION

1) UN No.: Not applicable

2) Proper shipping name: Not applicable

3) Class or division: Not applicable

4) Packing group: Not applicable

5) Marine pollutant: Not applicable

6) Special safety response for transportation or transportation measure: Not applicable

- IATA Classification: Not classified as dangerous under IATA transport

15. REGULATORY INFORMATION

1) Occupational Safety and Health Act in Korea: Not applicable


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
 - U.S.A. management information(EPCRA 304 regulation): Not applicable
 - U.S.A. management information(EPCRA 313 regulation): Not applicable

	Material Safety Data Sheet (MSDS)	Rev.No		8	
	ISU Lion 110	DATE	2019.12.06	PAGE	9/9

- 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
- ChemWATCH
- IUCLID
- ECOTOX
- NITE
- Recommendations on the transport of dangerous goods
- NCIS
- Emergency response guide book
- The Chemical Database
- ICSC
- RTECS
- ESIS
- HPVIS
- ECHA [CHEM](#)

2) Print date: 1996. 06. 28

3) Number of revised/Date of last revision: 8 / 2019. 12. 06

4) Other: No data available