

MATERIAL SAFETY DATA SHEET

RESIDUAL FUEL OIL (MULTIPLE TYPE)

CAS number: 68476-33-5

UN number: 1863 - 3



I. PRODUCT AND COMPANY IDENTIFICATION

Product name: Residual fuel oil.

Trade name: Fuel oil FO, Mazut (FO 180 - 0,5S; FO 380 - 0,5S; FO 3,0S; FO 3,5S).

Synonyms (not scientific name): Fuel oil, Heavy fuel oil, Bunker C, Bunker, Residual fuel oil, High sulphur residual fuel oil, Low sulphur residual fuel oil.

Supplier's name, address	Contact, Routine inquiries
VIETNAM NATIONAL PETROLEUM GROUP PETROLIMEX N°1-Kham Thien Str.-Dong Da Dist.-Hanoi	Vietnam National Petroleum Group N°1-Kham Thien Str.- Dong Da Dist.-Hanoi Tel. 04 38512 603 Fax. 04 38512 902

Manufacturer's name and address:

Intended use: Residual fuel for industrial boilers, furnaces etc. or for sea vessel's internal combustion engine etc.

II. HAZARDS IDENTIFICATION

1. Hazard classification:

- OSHA PEL - TWA: 5mg/m³ as mineral oil mist.
- ACGIH TLV - TWA: 1997 NOIC - 100mg/m³, skin, A3.
- NFPA Ratings Health:1 Fire:2 Reactivity:0.

2. Warning statement:

- The residual fuel oil is a flammable product, may cause low to medium irritation, harmful effect to the central nervous system if ingested.
- The residual fuel oil's vapor may cause dizziness if inhaled, the residual fuel oil may irritate eyes and skin. Repeated, prolonged contact might cause skin cancer.
- H₂S contained in the residual fuel oil may accumulate in the container's void space, with high concentration may cause faint or syncope.
- **Precaution when getting in contact with, storing, using:** The residual fuel oil is a combustible material, stored in liquid form in specialized container, needs to be kept away from heat source and children's reach. The composition of the residual fuel oil might include polycyclic aromatic hydrocarbons that is harmful to the health. The residual fuel oil need to

be maintained in well-ventilated space, avoiding the accumulation of H₂S contained in the material, use suitable protective equipment when getting into contact with the residual fuel oil. Avoid dropping, spilling, leaking during operation and usage process because the residual fuel oil might cause long-term negatives effects to the environment.

3. Health effects:

Eyes: May cause irritation and damage to the eyes.

Inhalation: May cause irritate and inhibit the nervous system and the respiratory system. H₂S with the concentration rate of 50-500 ppm may cause headache, dizziness, nausea. Higher rate than 500 ppm may cause faint or syncope.

Skin: Repeated and prolonged contact may cause skin's irritation and allergy.

Ingestion: Toxic to the digestive system, might spill to lung causing nausea, pneumonia.

III. COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS Number	Chemical Structure	Concentration (% weight)
1. Mazut	68476-33-5		100
2. Sulphur rate, max			3 level: 0,5 - 3,0 - 3,5

IV. FIRST AID MEASURES

1. Eyes contact:

Take the victim to a safe, well-ventilated space with fresh air. Use clean water to rinse eyes for at least 15 minutes, then get immediate medical attention.

2. Skin contact:

Remove contaminated clothes and shoes. Use water and soap to wash the part of skin exposed to the residual fuel oil. In case of burn through contact with hot product, cooling for around 10 minutes, then use bandages and get immediate medical attention.

Do not use gasoline, kerosene or other solvents to wash the affected skin or contaminated clothes.

3. Inhalation:

Take the victim to a safe, well-ventilated space with fresh air. In case of faint caused by the inhalation of H₂S, CPR, respiratory aids measures must be applied. Get immediate medical attention.

4. Ingestion:

Do not induce vomiting because it might lead to serious lung injuries and complications. Get immediate medical attention.

V. FIRE FIGHTING MEASURES

1. Flammable classification:

The residual fuel oil is a hazardous, flammable and combustible product. Its flash point $\geq 60^{\circ}\text{C}$.

2. Hazardous combustion products: The residual fuel oil upon combusted will produce: CO_x , SO_x , NO_x , H_2S , Hydrocarbon and several metal oxides.

3. Causes of fire: Fire sparks, electrostatic, high temperature, collision, friction spark, open flames.

4. Suitable fire extinguishing agents and guidance of fire fighting methods, others measures:

- **Fire extinguishing agents:** Use fire extinguisher and specialized fire fighting equipment (B type), CO_2 , sand, fire blanket; use water spray to cool down the fire-exposed surfaces of surroundings containers and equipment.

- **Fire fighting methods:** Take initial emergency response to isolate, extinguish the fire.

+ Cut off the power source related to the fire.

+ Prioritize in rescuing victims, preventing and isolating the residual fuel oil's source of leakage, if possible remove others nearby containers and equipment.

+ Use fire extinguisher, sand, fire blanket to extinguish the small fire.

+ Do not use water to extinguish, only use water spray to cool down the fire-exposed surfaces of surroundings containers and equipment.

+ Call and inform the Fire service to ask for assistance.

5. Required equipment, protection gears in case of fire:

- **Fire fighting equipment:** Fixed fire fighting equipment, fire truck, dry powder wheeled fire extinguisher $\geq 25\text{kg}$, CO_2 extinguisher, powder extinguisher 6-10kg, sand, buckets, fire blanket.

- **Protection equipment:** Flame resistant clothing, protection helmet with eye protection, gloves, boots.

6. Special attention notice:

The fuel oil's vapor is highly flammable, heavier than air and can move far away from the leaked source. If encountered with a fire source may cause fire outbreak to the leaked source.

VI. ACCIDENTAL RELEASE MEASURES

1. Small spill:

- Looking for a way to contain the source of spillage, leakage. Evacuate the incident zone.

- Isolate the area affected by the spill, leak. Assign supervision and warn others about said area.

- Forbid any fire source, fire spark in case of spill, leak.

- Use sand, rag, oil sorbents to clean up the affected area as quickly as possible, then collect into specialized container for proper disposal.

- Prevent the residual fuel oil from leaking into the drainage system.

- The case of hot residual fuel oil's leakage within confined space is very dangerous due to the presence of H_2S gas. Protection equipment is required when participating in the

incident response.

2. Large spill:

- Looking for a way to cut off power source, cease all operation of transferring residual fuel oil.
- Isolate the area affected by the spill, leak. Prepare the fire prevention and fire fighting plan, methods.
- Utilize protection plan for the incident zone, prevent the residual fuel oil from spreading and deploy recovery measures accordingly to the oil spill response plan of the company.
- Inform the authorities for assistance of oil spill response.

VII. HANDLING AND STORAGE

1. Handling:

- To avoid fire or explosion, dissipate electrostatic during transfer by grounding the containers and equipment before transferring the product.
- During transferring the residual fuel oil to/from transportation vehicles, it is strictly forbidden to: start the vehicle's engine, check the power source, maintain and clean the vehicle.
- Forbidden of fire, smoke, usage of portable electrical, communication devices that are not explosion proof in hazardous areas.
- Prevent the spill, leak, drop of the residual fuel oil.
- Avoid inhaling the residual fuel oil's vapor directly.
- Use protection equipment when getting into contact with the residual fuel oil. Wash hands and clean up after contact.

2. Storage:

- Store fuel oil in specialized equipment, keep the containers closed. Store in cool, well-ventilated area.
- Prevent the containers from strong impact, separate from heat source, fire spark and strong oxidants.
- Install the automatic fire alarm system.
- Comply with the Government's requirements on fire protection and fire fighting, environment protection, oil spill prevention when operating petroleum facilities.
- Fire fighting equipment must be fully equipped following the Government's requirements when handling, transferring, storing the residual fuel oil.

VIII. EXPOSURE CONTROL AND PERSONAL PROTECTION

1. Exposure control:

- Ensure natural ventilation or use explosion-proof equipment to keep the storage zone, loading and unloading zone well-ventilated.
- Install anti-lightning, anti-static equipment, explosion-proof electrical system at the storage, operation, transportation zone following the Government's requirements.

2. Personal protection for working:

- Eye protection: Specialized protection equipment is not required. Goggles are recommended in necessity case.
- Body protection: Use protective clothing.
- Skin protection: Use protective gloves.
- Respiratory protection: Avoid the inhalation of the residual fuel oil's vapor, H₂S gas. Use medical oxygen cylinder if the surrounding space is lacking of fresh air.

3. Personal protection for responding incident:

- The oil spill response team, fire fighting team must be equipped with specialized tool and equipment when approaching and handling the incident.

4. Sanitation measures:

- Wash hands with soap and clean up after getting into contact with the residual fuel oil.

IX. PHYSICAL AND CHEMICAL PROPERTIES

Physical state: Liquid	Boiling point (°C): >260°C
Colour: Black	Melting point (°C): Not available
Odour: Characteristic odour	Flash point (°C): ≥60°C
Vapor pressure: < 0,1psia at 21°C	Kindling point (°C): Not available
Vapor density (Air = 1): Not available	Upper flammable limit (% Substance with air): Not available
pH: Not available	Lower flammable limit (% Substance with air): Not available
Mass density (kg/l) at 15°C: 0,97-0,991	Other properties: Standard 04:2019/PLX and Standard 05:2019/PLX

X. STABILITY AND REACTIVITY**1. Stability:**

- Is stable under normal conditions and stored at normal temperature and pressure.
- Avoid any heat source, open flames, high energy ignition source, electrostatic and strong oxidants.

2. Reactivity:

- Do not generate polymerization.
- Products of combustion: CO_x, SO_x, H₂S, Hydrocarbon etc.

XI. TOXICOLOGICAL INFORMATION

- Acute poisoning to rabbit: LD50 > 5 ml/kg.
- Oral poisoning to mice: 5,1 ml/kg.
- Irritate eyes, skin.
- Cancer's possibility: OSHA: NO, IARC: 2B (animal), NTP: YES, ACGIH: 1997 NOIC: A1. The residual fuel oil compose of polycyclic aromatic hydrocarbons, according to research might cause skin cancer to animal. Sign not determined for human.

XII. ECOLOGICAL INFORMATION

- Toxicity to aquatic ecosystem: Prolonged influence to aquatic animal.
- Rottenness by bacteria: Natural biodegradable.

XIII. DISPOSAL INFORMATION

The disposal process must follow the procedure and general standard about chemical's disposal specified in the Law on Environment protection, assuring the safety for human and environment.

XIV. TRANSPORT INFORMATION

- UN number: 1863 – 3.
- Decree N°104/2009/NĐ-CP dated 09/11/2009 of the Government providing the list of dangerous goods and the transport of dangerous goods by road motor vehicles.
- Decree N°29/2005/NĐ-CP dated 10/03/2005 of the Government providing the list of dangerous goods and the transport of dangerous goods by inland waterway.
- Proper Shipping Name: Combustible liquids (Fuel oil).
Hazard Class and Packing Group: PG III.
DOT Identification Number: NA 1993.

XV. REGULATORY INFORMATION

1. Declaration and registration's status worldwide:

- United nations, EC, International organizations of production, trade, products and oil's transportation from USA, UK, Singapore, etc. have legal regulation on MSDS's declaration.

2. Classification of dangers according to declared, registered nation:

- EU category of danger: carcinogenic category 2, dangerous for the environment, R45, R66, R52/53, S53, S45, S61.
- Canadian regulatory information (WHMIS) Class B, division 3 (combustible liquid).

XVI. OTHER INFORMATION

Date of compilation: 1st April 2020.

Name of organization, individual responsible for drafting:

VIETNAM NATIONAL PETROLEUM GROUP (PETROLIMEX)

DISCLAIMER FOR USER:

- The information and recommendations in this Material Data Safety Sheet are, to the best knowledge and belief, accurate and reliable as of the date issued, and must be used to apply methods preventing risk, accident.

- Dangerous chemical presented in this sheet might have others dangerous properties under the control of the user.

- **Petrolimex shall not be held responsible for any damage resulting from abnormal use of the recommendations presented in this Material Data Safety Sheet.**