SDS(Safety Data Sheet)

Product	MFO380 (Marine Fuel Oil 380)		
MSDS Number	List No.	Issuing date	Last revised date
-	PD1175	2016-10-07	2022-11-02

1. IDENTIFICATION

1) Product name

MFO380 (Marine Fuel Oil 380)

2) Recommended use of the chemical and restriction on use

- Recommended use: Others
  기타
- Restrictions on use: Do not use for any other purpose.

3) Details of the supplier of the safety data sheet

○ **Manufacturer**

- Company name: GS Caltex Corporation
- Address: GS Tower, 508, Nonhyeon-ro, Gangnam-gu, Seoul, Korea
- Emergency telephone number: 1544-5151

2. HAZARDS IDENTIFICATION

1) Classification of the product

CARCINOGENICITY : Category 1B

2) Label elements

○ **Hazard pictograms**

○ **Signal word**

Danger

○ **Hazard statements**

- H350 May cause cancer.(dermal)

○ **Precautionary statements**

1) Prevention

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.

2) Response

- P308 + P313 IF exposed or concerned: Get medical advice/attention.
- P370 + P378 In case of fire: Use manufacturer/supplier or the competent authority to specify appropriate

media for extinction.

3) Storage

- P403 Store in a well-ventilated place.
- P405 Store locked up.

4) Disposal

- P501 Dispose of contents/container to ....

3) Other hazards

○ **Product NFPA Level**

(※ 0-Lack, 1-Low, 2-Moderate, 3-High, 4-Very High)

Product name	Health	Flammable	Reaction
MFO380 (Marine Fuel Oil 380)	0	2	0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	Trade names and Synonyms	CAS No.	EC No.	Contain Ratio(%)
Residues (petroleum), atm. tower		64741-45-3	265-045-2	96.5
Sulfur, precipitated, sublimed or colloidal	Brimstone;Colloidal sulfur	7704-34-9	231-722-6	3.5

4. FIRST AID MEASURES

1) Eye contact

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes.
- If eye irritation persists: Get medical advice/attention.

2) Skin contact

- In case of contact with substance, immediately flush skin with running water for at least 20 minutes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- If skin irritation occurs: Get medical advice/attention.

3) Inhalation

- Do not use mouth-to-mouth method if victim inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- IF exposed or concerned: Get medical advice/attention.

4) Ingestion

- Do not use mouth-to-mouth method if victim ingested the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

5) Indication of any

- Exposures require specialized first aid with contact and medical follow-up.

immediate medical attention and special treatment needed	- 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. - For mixtures containing alcohol or polar solvent: Alcohol-resistant foam - Direct water (Unsuitable extinguishing media)
2) Special hazards arising from the substance or mixture	- Can form explosive mixtures at temperatures at or above the flashpoint. - Fire may produce irritating, corrosive and/or toxic gases. - Heating may cause a fire or explosion.
3) Special protective equipment and precautions for firefighters	- Rescuers should put on appropriate protective gear. - Fire involving Tanks: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. - In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. - Eliminate all ignition sources if safe to do so.

6. ACCIDENTAL RELEASE MEASURES

1) Health considerations and protective equipment	- Clean up spills immediately, observing precautions in Protective Equipment section. - ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). - All equipment used when handling the product must be grounded. - Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. - Please note that materials and conditions to be avoided.
2) Environmental precautions	- Large spill: Prevent entry into waterways, sewers, basements or confined areas.
3) Methods and material for containment and cleaning up	- Dike and collect water used to fight fire. - 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.

7. HANDLING AND STORAGE

1) Precautions for safe handling	- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. - Follow all MSDS/label precautions even after container is emptied because they may retain product residues.

- Avoid breathing vapors from heated material.
- All equipment used when handling the product must be grounded.
- Please note that materials and conditions to be avoided.
- Handling refer to engineering control/personal protection section.
- Use only outdoors or in a well-ventilated area.

2) Conditions for safe storage (including any incompatibilities)

- Please note that materials and conditions to be avoided.
- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Store in a well-ventilated place. Keep container tightly closed.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Control parameters

Chemical name	Exposure limits	ACGIH TLV	OSHA PEL	Biological limit values(BLV)
Residues (petroleum), atm. tower	Not available	Not available	Not available	Not available
Sulfur, precipitated, sublimed or colloidal	Not available	Not available	Not available	Not available

2) Appropriate engineering controls

- Install local exhaust ventilation system.
- Check legal suitability of exposure level.

3) Personal protection equipment

○ **Respiratory protection**

- If exposure consentration of the material is lower than 100 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material ; such
- If exposure consentration of the paticle material is lower than 250 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material
- If exposure consentration of the particle material is lower than 500 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate materia
- If exposure consentration of the particle material is lower than 10000 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate mater
- If exposure consentration of the material is lower than 100000 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material ; su
- If exposure consentration of the material exceeds the permitted exposure standards, Wear European Standard EN 149 approved full or half face piece (with

goggles) respireatory protective equipment.

○ **Eye protection**
- An eye wash unit and safety shower station should be available nearby work place.
- Wear breathable safety goggles to protect from vapour state organic material causing eye irritation or other disorder.

○ **Hand protection**
- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

○ **Body protection**
- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Item	Input Value
Apperance	Liquid
Color	No Data
Smell	Strong Hydrocarbon
Smell Threshold	No Data
pH (Numerical value)	No Data
Melting/Freezing Point	No Data
Boilling Point	No Data
Flash Point	70 °C
Evaporating Rate	No Data
Flammability(Solid, Gas)	No Data
Explosibility Range	5.0/1.0 %
Steam Pressure	No Data
Solubility	No Data
Vapor Density	No Data
Specific Gravity	<0.991
Distribution Coefficient	No Data
SelfIgnition Temperature	No Data
Pyrolysis Temperature	No Data
Viscosity	No Data
Molecular Weight	No Data

10. STABILITY AND REACTIVITY

1) Chemical Stability and
- Can form explosive mixtures at temperatures at or above the flashpoint.

hazardous reactivity	- 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, friction, shock, contamination)
3) Incompatible materials	- Combustibles
4) Hazardous decomposition products	- During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

11. TOXICOLOGICAL INFORMATION

1) Information on the likely routes of exposures

○ **Inhalation**

- No inhalation effects through respiratory system.

○ **Skin contact**

- No effect on skin contact.

○ **Eye contact**

- No effect on eye contact.

○ **Ingestion**

- No ingestion effect through mouth.

2) Health hazard information

○ **Acute toxicity**

*** Oral - Not classified (ATEmix > 2000 mg/kg)**

- Residues (petroleum), atm. tower : rat(male/female); LD50 > 5000 mg/kg bw, no deaths (EU Method B.1 bis, GLP) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : rat(male/female); LD50 > 2000 mg/kg bw, no deaths (OECD TG 401, GLP) (ECHA)

*** Dermal - Not classified (ATEmix > 2000 mg/kg)**

- Residues (petroleum), atm. tower : rabbit; LD50 > 2000 mg/kg bw, no deaths (OECD TG 434, GLP) (read across : 64741-62-4) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : rat(male/female); LD50 > 2000 mg/kg bw, no deaths (OECD TG 402, GLP) (ECHA)

*** Inhalation(Gas) - Not applicable**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

*** Inhalation(Vapour) - Not classified (ATEmix > 20 mg/L)**

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : Not available

*** Inhalation(Dust, mist) - Not classified (ATEmix > 5 mg/L)**

- Residues (petroleum), atm. tower : rat; inhalation: aerosol; LC50 > 3.6 mg/L air/4h, no deaths (EPA OTS 798.1150, GLP) (read across : F-73-01, carbon black oil) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : rat(male/female); LC50 > 5.43 mg/L air/4h (OECD TG 403, GLP) (ECHA)

○ **Skin corrosion/Irritation : Not classified**

- Residues (petroleum), atm. tower : rabbit; not irritating (OECD TG 404, GLP) (read across : 68553-00-4) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : rabbit; irritating (OECD TG 404, GLP) (ECHA)

○ **Serious eye damage/irritation : Not classified**

- Residues (petroleum), atm. tower : rabbit; not irritating (EU Method B.5, GLP) (read across : 68553-00-4) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : rabbit; not irritating (OECD TG 405, GLP) (ECHA)

○ **Respiratory sensitization : Not classified**

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : Not available

○ **Skin sensitization : Not classified**

- Residues (petroleum), atm. tower : guinea pig; not sensitising (OECD TG 406, GLP) (read across : 68553-00-4) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : guinea pig; not sensitising (OECD TG 406, GLP) (ECHA)

○ **Carcinogenicity : Category 1B**

- Residues (petroleum), atm. tower : EU CLP : Carc. 1B
  dermal; mouse; lifetime; 0.1%, 1.0%, 10% in toluene; The test substance was a dermal carcinogen. (read across : 64741-62-4) (OECD TG 451, GLP) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : IARC, EU CLP 1272/2008, OSHA, ACGIH, US EPA IRIS, NTP : not listed

○ **Germ cell mutagenicity : Not classified**

- Residues (petroleum), atm. tower : In vitro bacterial reverse mutation assay : positive (OECD TG 471, GLP) (read across : 64741-62-4) (ECHA), In Vitro Mammalian Cell Gene Mutation Test : negative (OECD TG 476, GLP) (read across : 64741-62-4) (ECHA)
  IN VIVO sister chromatid exchange assay : positive (EPA OTS 798.5915, GLP) (read across : 64741-62-4) (ECHA), in vivo micronucleus assay : negative (EU Method B.12) (read across : catalytically cracked clarified oil) (ECHA), in vivo chromosome aberration assay : negative (OECD TG 475, GLP) (read across : 64741-62-4) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : in vitro mammalian chromosome aberration test : negative (OECD TG 473, GLP) (ECHA), in vitro Bacterial Reverse Mutation Assay : negative (OECD TG 471, GLP) (ECHA)
  In vivo Mammalian Erythrocyte Micronucleus Test : negative (OECD TG 474, GLP) (ECHA)

○ **Reproductive toxicity : Not classified**

- Residues (petroleum), atm. tower : rat; developmental toxicity; based on decrease in body weight, NOAEL = 10 mg/kg bw/day (ECHA)
- Sulfur, precipitated, sublimed or colloidal : Not available

○ **Specific target organ toxicity (single exposure) : Not classified**

- Residues (petroleum), atm. tower : inhalation; rat; Laboured breathing, nasal discharge and discoloured fur (head and body) in all groups during and up to 4 hr post-exposure. LC50 > 3.6 mg/L air/4h, no deaths (EPA OTS 798.1150, GLP) (read across : F-73-01, carbon black oil) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : oral; rat(male/female); Findings were considered to reflect the normal spectrum of spontaneous lesions present in rats of this strain and age. LD50 > 2000 mg/kg bw, no deaths (OECD TG 401, GLP) (ECHA)
  dermal; rat(male/female); Findings were considered to reflect the normal spectrum of spontaneous lesions present in rats of this strain and age. LD50 > 2000 mg/kg bw, no deaths (OECD TG 402, GLP) (ECHA)
  inhalation; rat(male/female); Within one week after exposure all surviving rats recovered and no clinical signs were observed anymore. LC50 > 5.43 mg/L air/4h (OECD TG 403, GLP) (ECHA)

○ **Specific target organ toxicity (repeated exposure) : Not classified**

- Residues (petroleum), atm. tower : dermal; rat; 0, 1.06, 10.6, 53, 106, 530 mg/kg bw/d; 90 days; Based on these overall findings the NOAEL for systemic toxicity in both sexes was 1.06 mg/kg bw/d (reflecting increased relative liver weight in both sexes, and the occurrence of liver histopathology and decreased platelet count in males only). (EPA OPPTS 870.3250, GLP) (read across : F-179, petrobase 100) (ECHA)
- Sulfur, precipitated, sublimed or colloidal : oral; rat(male/female); 100, 400, 1000 mg/kg bw/day; 90 days; Based on the lack of treatment-related effects, the subchronic toxicity NOAEL was determined to be 1000 mg/kg bw/day. (OECD TG 408, GLP) (ECHA)
  dermal; rat(male/female); 100, 400, 1000 mg/kg bw/day; 21-23 days; Based on the lack of systemic toxicity effects observed in this study, the NOAEL for systemic effects was determined to be 1000 mg/kg bw/day. The NOAEL for local dermal effects was 400 mg/kg bw/day. (OECD TG 410, GLP) (ECHA)

○ **Aspiration hazard : Not classified**

- Residues (petroleum), atm. tower : ca. 6 - 55 mm^2/s (100.0°C) (ECHA) & hydrocarbons; but kinematic viscosity at 40 °C was unknown.
- Sulfur, precipitated, sublimed or colloidal : Not applicable

12. ECOLOGICAL INFORMATION

1) Ecotoxicity

- Acute toxicity : Not classfied (ATEmix>1mg/L)
- Chronic toxicity : Not classfied

○ **Acute (short-term) aquatic hazard:**

Fish

- Residues (petroleum), atm. tower : No toxic effect observed within the range of water solubility(0.01038 mg/L) (ECHA).
- Sulfur, precipitated, sublimed or colloidal : Not available

Invertebrates

- Residues (petroleum), atm. tower : No toxic effect observed within the range of water solubility(0.01038

mg/L) (ECHA).

- Sulfur, precipitated, sublimed or colloidal : No toxic effects occur within the range of water solubility. (ECHA)

Aquatic algae

- Residues (petroleum), atm. tower : No toxic effect observed within the range of water solubility(0.01038 mg/L) (ECHA).
- Sulfur, precipitated, sublimed or colloidal : No toxic effects occur within the range of water solubility. (ECHA)

○ **Chronic (Long-term) aquatic hazard:**

Fish

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : Not available

Invertebrates

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : No toxic effects occur within the range of water solubility. (ECHA)

Aquatic algae

- Residues (petroleum), atm. tower : No toxic effect observed within the range of water solubility(0.01038 mg/L) (ECHA).
- Sulfur, precipitated, sublimed or colloidal : Not available

2) Persistence and degradability

○ **Persistence**

- Residues (petroleum), atm. tower : log Kow = 6.13 (experimental) (EPISUITE)
- Sulfur, precipitated, sublimed or colloidal : log Kow = -1.38 (experimental) (EPISUITE)

○ **Degradability**

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : Sulfur pure test material showed a half life of 4.25 hours when illuminated with 80000 lux at 25°C. (ECHA)

3) Bioaccumulative potential

○ **Bioaccumulation**

- Residues (petroleum), atm. tower : BCF = 5147 (EPISUITE)
- Sulfur, precipitated, sublimed or colloidal : BCF = 3.162 (estimated) (EPISUITE)

○ **Biodegradation**

- Residues (petroleum), atm. tower : Not available
- Sulfur, precipitated, sublimed or colloidal : Not available

4) Mobility in soil

- Residues (petroleum), atm. tower : Koc = 208800 (EPISUITE)
- Sulfur, precipitated, sublimed or colloidal : Koc = 0.06337 (EPISUITE)

5) Hazard to the ozone layer

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

6) Other adverse effects

- Residues (petroleum), atm. tower : Not available

- Sulfur, precipitated, sublimed or colloidal : Not available

13. DISPOSAL CONSIDERATIONS

1) Disposal methods

- Waste must be disposed of in accordance with federal, state and local environmental control regulation.

2) Special precaution for disposal

- Consider the required attentions in accordance with waste treatment management regulation.

14. TRANSPORT INFORMATION

1) UN No.

- 1993

2) Proper shipping name

- FLAMMABLE LIQUID, N.O.S.

3) Transport hazard class(es)

- 3

4) Packing group

- III

5) Marine pollutant

- Not applicable

6) Special safety response for transportation or transportation measure

- Types of Emergency Measures in Case of Fire : F-E
- Types of Emergency Measures in Leakage : S-E

15. REGULATORY INFORMATION

EINECS(or ELINCS)

- Residues (petroleum), atm. tower : European EINECS phase-in substance
- Sulfur, precipitated, sublimed or colloidal : European EINECS phase-in substance

EU CLP (CLASSIFICATION) - PRODUCT : Not applicable

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

Substances restricted under REACH

- Residues (petroleum), atm. tower : Substances restricted under REACH
- Sulfur, precipitated, sublimed or colloidal : Not applicable

Substances subject to authorization under REACH

REACH SVHC List

Korea

○ **Occupational Safety and Health Act**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **K-REACH**

- Residues (petroleum), atm. tower : Not applicable

- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **Chemical Control Act in Korea**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : List of substance subjected to the PRTR

○ **Safety Control of Dangerous Substances Act**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Dangerous substance

U.S.A

○ **US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **CERCLA Designation of hazardous substances (40 CFR 302.4)**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **CERCLA Section 302 regulation**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **CERCLA Section 304 regulation**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **CERCLA Section 313 regulation**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

Interntional Convention on Environment

○ **Rotterdam Convention list**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **Stockholm Convention list**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **Montreal Protocol list**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

National Inventory

○ **Korea**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

○ **U.S.A**

- Residues (petroleum), atm. tower : US TSCA phase-in substance
- Sulfur, precipitated, sublimed or colloidal : US TSCA phase-in substance

○ **China**

- Residues (petroleum), atm. tower : China phase-in substance
- Sulfur, precipitated, sublimed or colloidal : China phase-in substance

○ **Japan**

- Residues (petroleum), atm. tower : Not applicable
- Sulfur, precipitated, sublimed or colloidal : Not applicable

16. OTHER INFORMATION

1) Reference

- Sources of information used in preparing this SDS included one or more of the following: Internal technical data, data from OECD eChemPortal, ECHA, NITE, TOXNET, IPCS and KOSHA search results.

2) Issue Date

- 2016-10-07

3) Revision number and Last date revised

○ **Number of revised**

- 2

○ **Date of last revision**

- 2021-12-22

○ **Last Revision History**

- This MSDS was revised in accordance with the latest revision on GHS Database

4) Other

- The information contained in the Safety Data Sheet is at the date of its issuance to the best of our knowledge correct according to the data available to us. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.