

PETROLEUM CRUDE OIL

Class 3 (Flammable Liquid) or Combustible Liquid

GENERAL INFORMATION

Petroleum crude oil is a flammable, variably light to dark colored liquid hydrocarbon with properties between gasoline and kerosene. It is used as a raw material for making fuels and various chemicals. Barely soluble in water and slightly lighter, petroleum crude oil will form a floating surface slick. Flammability of this product can vary widely having a flash point range from -45 to 392°F. The liquid may evaporate easily even at low temperatures. The vapors of the more volatile, and therefore more flammable crude oil, are heavier than air, may accumulate and persist in low areas, and may travel some distance to a source of ignition and flash back. Similarly, accumulations of vapor in confined spaces such as buildings or sewers may explode if ignited and there is some potential that containers of liquid may rupture violently if exposed to fire or excessive heat for sufficient time duration. Typical crude oil weigh approximately 6.3-8.3 pounds per gallon.

Petroleum crude oil will not react with water or other common materials and is stable in normal transportation. It is incompatible with strong oxidizers, and may attack some forms of plastics, rubber, and coatings. Toxicity by potential routes of exposure is generally considered low to moderate. The more volatile mixtures may be present in air in high concentrations creating an inhalation hazard. There is also the possibility that the crude oil may contain some fraction of toxic benzene or hydrogen sulfide (see separate guides). Products of combustion may include toxic constituents.

CHEMICAL/PHYSICAL DATA

Solubility in Water: Practically insoluble, below 0.1%

Solubility in Other Chemicals: Soluble in various hydrocarbon liquids.

Specific Gravity (Liquid): Varies, 0.75 - 0.99

Vapor Density: 3.4 (approximately)

Boiling Point: Varies, 1000+°F (538+°C).

Melting Point: Unavailable

Freezing Point: Unavailable

Molecular Weight: Complex mixture, approximately 99

Heat of Combustion: 10,290 - 10,460 cal/g (Petroleum distillates)

Evaporation Rate (butyl acetate=1): 10 (approximately)

Vapor Pressure: Varies widely with composition, 40 mmHg for petroleum distillates.

Flash Point: Varies widely -45 to 392°F (-43 to 200°C)

Autoignition Temperature: 450 - 500°F (232 - 260°C)

Burning Rate: 4 mm/minute

Flammable Limits: 0.4% (LEL) - 15% (UEL)

Stability: Stable

Polymerization Potential: Will not occur.

Corrosiveness: Relatively noncorrosive but may attack some forms of plastics, rubber, and coatings.

Reactivity with Water: No reaction

Reactivity and Incompatibility: Reacts with strong oxidizing materials. Avoid chlorine, fluorine.

IDENTIFICATION

Shipping Name(s): Petroleum crude oil (USDOT & IMO).

Synonyms and Tradenames: Crude oil ; Mineral oil; Rock oil; Coal oil; Petroleum.

CAS Registry No.: 8002-05-9

Chemical Formula: C₆-C₁₃ hydrocarbon mixture. Crude oil is a naturally occurring complex mixture of hydrocarbons whose exact composition and physical properties can vary widely depending upon its source.

Constituent Components (% each): Complex mixture of petroleum hydrocarbons; may contain 0-10% benzene.

UN/NA Designation: UN1267

IMO Designation: 3.1, 3.2 or 3.3, Flammable liquids

NFPA 704 Hazard Rating: 2(Health): 3(Flammability): 0(Reactivity)

Physical Form as Shipped: Liquid

Physical Form as Released: Liquid

Color of the Shipped Material: Dark yellow to brown or greenish-black, oily liquid.

Odor Characteristics: Like gasoline and kerosene

Reportable Quantity: See appendix I.

Common Uses: Raw material for making fuels and various chemicals.

ADDITIONAL INFORMATION AND ASSISTANCE: FOR 24-HOUR TECHNICAL SUPPORT FOR ACCIDENTS INVOLVING SPILLS, LEAKS, FIRES OR EXPOSURES TO CHEMICALS, CONTACT CHEMTREC AT (800) 424-9300 OR (703) 527-3887 (COLLECT).



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or

or



POTENTIAL HAZARDS

GENERAL HAZARDS

Threshold Odor Concentration: Varies

Unusual Hazards: Properties uncertain. Vapors of some crude oil may be heavier than air and may travel to a source of ignition. Some may include significant amounts of benzene (see separate guide).

Short Term Exposure Limit (STEL): Unavailable

Time Weighted Average (TLV-TWA): 86 ppm (350 mg/m³) (Petroleum distillates).

Ceiling (C) Limit: 444 ppm (1800 mg/m³) (Petroleum distillates).

IDLH: 1100 ppm or 10% LEL (Petroleum distillates).

Conditions to Avoid: Heat, fire, or sparks; contact with incompatible materials; runoff to sewers or water bodies; inhalation, ingestion, or direct physical contact.

HEALTH HAZARDS

Public Health Hazards: Major hazard is from inhalation of high vapor concentrations in air. Ingestion and direct contact are also to be avoided. (Note: Any benzene in the product increases both acute and chronic health risks.)

Hazards of Skin or Eye Contact: Repeated or prolonged contact with liquid petroleum crude oil may cause drying, cracking, and inflammation of the skin due to the defatting action of the product. Contact with the eyes may result in irritation and possibly temporary corneal injury.

Hazards of Inhalation: Vapors of petroleum crude oil may be irritating to the eyes and the upper respiratory tract. High concentrations in air may result in narcosis and central nervous system depression with symptoms including inebriation, headache, nausea, dizziness, drowsiness, unconsciousness, convulsions, and possibly death. Some symptoms may be evident after 1 hour at 4000-7000 ppm in air. Acute overexposure may also result in persistent anorexia and nervousness on occasion.

Hazards of Ingestion: Ingestion may cause a burning sensation, vomiting, diarrhea, drowsiness, and symptoms listed above. Aspiration into the lungs during vomiting may result in pulmonary edema with possibly severe consequences.

FIRE HAZARDS

Lower Flammable Limit: 0.4%

Upper Flammable Limit: 15%

Behavior in Fire: Flammable liquid. Liquid will burn but may be difficult to ignite depending on constituents. Flammable liquids may generate large quantities of flammable vapor upon release. Vapors of flammable liquids are heavier than air, may accumulate and persist in low areas, and may travel to a source of ignition and flash back. There is some potential that containers may rupture violently in fire.

Hazardous Decomposition Products: Not well-defined, may include toxic constituents such as carbon monoxide, carbon dioxide, oxides of sulfur and reactive hydrocarbons.

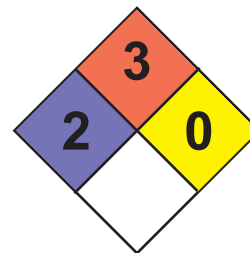
EXPLOSION HAZARDS

Explosive Potential: Explosion may result if vapors are ignited in a confined area. There is some potential that containers may rupture violently in fire. Product is sensitive to static discharge and is an extreme fire hazard. Vapors can burn with explosive violence.

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PERSONAL PROTECTIVE CLOTHING AND EQUIPEMENT

Protective Clothing Required: Equipment should prevent repeated or prolonged skin contact and any reasonable probability of eye contact with the spilled product. This may include rubber boots, gloves, face shields, splash-proof safety goggles, and other impervious and resistant clothing. Compatible materials may include neoprene, nitrile rubber, chlorinated polyethylene, polyurethane, polyvinyl alcohol, Viton®, and nitrile-butadiene rubber.

Respiratory Protection: For unknown concentrations, fire fighting, or high concentrations, a self-contained breathing apparatus (SCBA) with full facepiece. For lesser concentrations, an air purifying respirator (APR) with organic vapor cartridge with a full facepiece within the use limitations of these devices.

FIRST AID

Nonspecific Symptoms: Irritation of the eyes, skin, or respiratory tract; other symptoms of exposure.

First Aid for Inhalation: Remove victim to fresh air and keep warm and at rest. If breathing becomes difficult or if breathing has stopped, administer artificial respiration. Get medical attention immediately. (Caution: Administration of mouth-to-mouth resuscitation may expose the first aid provider to chemical within the victim's lungs or vomit.)

First Aid for Skin Contact: In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes, while holding eyelids apart in order to rinse entire surface of eye and lids with water. Provide supportive care and seek immediate medical assistance by a physician from the nearest medical treatment facility.

First Aid for Eye Contact: Remove all contaminated clothing. Wash affected body areas with large amounts of water. Decontaminate the patient thoroughly before transporting to a medical treatment facility to prevent the potential for secondary contamination.

First Aid for Ingestion: Do not induce vomiting. Keep victim warm and at rest. Get medical attention immediately.

Note to Physician: Hydrocarbons may sensitize the heart to epinephrine and other circulating catecholamines so that arrhythmias may occur. Careful consideration of this potential adverse effect should precede administration of epinephrine or other cardiac stimulants and the selection of bronchodilators.

FIRE RESPONSE

Extinguishing Agents: Carbon dioxide, dry chemical, foam, or water spray. Water may be ineffective and there is some possibility that foam or water may cause some frothing.

Extinguishing Techniques: Stay upwind. Wear breathing apparatus and appropriate protective clothing. Move container from fire area if no risk. Do not extinguish burning cargo unless flow can be stopped safely. Be alert to container rupture potential. Stay away from ends of tank involved in fire but realize that shrapnel may travel in any direction. Use water from side and from safe distance to keep fire exposed containers cool. For massive fire in cargo area, use unmanned hose holder or monitor nozzles. Withdraw immediately in case of rising sound from venting safety device or discoloration of tank.

Note: Crude oil fires may produce a highly dangerous phenomenon known as a BOILOVER, whereby light hydrocarbons burn off at the surface of the fire and heavy superheated hydrocarbons sink to the bottom and come in contact with water bottoms. The super heated product converts the water to steam and forces burning crude oil out of the tank. Burning crude oil which has accumulated in tanks or diked areas are susceptible to boilovers. Seek expert advice on how to fight a crude oil fire.

SPILL RESPONSES

General Information: Proceed with caution. Restrict access to area. Keep unprotected personnel upwind of spill area.

Eliminate ignition sources. Prevent liquid from entering sewers and confined spaces. Protect sewers and waterways from contaminated runoff. Notify proper authorities, downstream sewer and water treatment operations, and other downstream users of potentially contaminated water. Note that intake of petroleum crude oil may result in rupture or explosion of boilers or industrial process equipment. Use intrinsically safe equipment where necessary. Choose equipment, where possible, that is not corroded or otherwise damaged by the spilled product. Take the specific flammability hazard and possible volatility of the spilled product into account while planning the response.

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AIR RELEASE

TECHNIQUE

MONITOR THE SITUATION . . . The product may not produce large amounts of hazardous airborne contaminants in many outdoor spill situations. It may be advisable in some cases to simply monitor the situation until the spilled product is removed by product and container specialists.

CONSEQUENCE

Hazardous levels of product in air may be found in the local spill area and immediately downwind.

MITIGATION

Remove the spilled product as soon as possible. Restrict access to the local spill area and areas immediately downwind by unprotected personnel.

TECHNIQUE

WATER FOG OR SPRAY . . . Water fog or spray applied to petroleum crude oil vapors or fumes may accelerate their dispersal in the atmosphere. (Note: There is some possibility that water may cause frothing.)

CONSEQUENCE

Increases in spill surface area and atmospheric conditions may increase the rate of vapor generation. In enclosed areas, runoff may add to spill volume and overflow impoundments. Water runoff may contain a small amount (if any) of petroleum crude oil from contact with airborne vapors or fumes.

MITIGATION

Contain contaminated water and remove or treat as soon as possible to prevent spread of contamination. Be alert to conditions such as fire hose runoff or rainwater that may add to spill volume and overflow impoundments.

TECHNIQUE

FOAM . . . Firefighting foam applied to the surface of liquid pools may slow the release of petroleum crude oil vapors into the atmosphere. (Note: There is some possibility that foam may cause frothing.)

CONSEQUENCE

The effects of the foam may be short term. As the foam breaks down, release of vapors will increase. Products of foam breakdown will add to the volume of spilled material.

MITIGATION

Continue foam applications until spilled product is removed. Contain foam runoff and treat as hazardous waste.

LAND SPILL

TECHNIQUE

CONFINEMENT DIKES . . . Petroleum crude oil may be confined by building dikes using soil, sand or other materials.

CONSEQUENCE

Confined petroleum crude oil may percolate into soil or seep through dike material. This may result in loss of confined product and spread of contamination.

MITIGATION

Remove or neutralize contained product as soon as possible to prevent spread of contamination. Be alert to conditions such as fire hose runoff or rainwater that may overflow impoundments. Where possible, line collection area with compatible impervious materials.

TECHNIQUE

EXCAVATION . . . Spills of material may be confined by building trenches or ditches.

CONSEQUENCE

Material may leach into soil. Deep excavations may increase the potential for groundwater contamination in some areas. This may result in loss of confined product and spread of contamination.

MITIGATION

Remove material from contaminated area as quickly as possible to prevent possible contamination beyond the spill area. Water sprays may be used to reduce vapors, except in enclosed areas where runoff may accumulate and overflow impoundments. Be alert to condition such as increasing spill volume with runoff or rain water which may overflow diked areas. If possible, confinement areas should be lined with suitable, impervious material to prevent penetration into soil.

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TECHNIQUE

PUMPING/VACUUM SUCTION . . . Spilled material confined in diked areas may be recovered using compatible hoses, pumps and vacuum trucks. All product transfer equipment should be properly bonded and grounded.

CONSEQUENCE

Equipment that is not compatible with the spilled product may become damaged and present a safety hazard for response personnel. Mechanical equipment will become contaminated with removed product.

MITIGATION

Use equipment constructed of materials compatible with the spilled product. Decontaminate equipment.

TECHNIQUE

ABSORPTION . . . Spreading of spilled product may be controlled by absorbing liquid with sand, earth, clay, fly ash, cement powder, peat moss, saw dust, straw, commercial sorbents, or other compatible substances.

CONSEQUENCE

Once used, sorbent materials pose the same hazards as the spilled product. Their use adds to the overall volume of contaminated material.

MITIGATION

Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents. Remove contaminated sorbents to safe storage by mechanical means.

TECHNIQUE

MECHANICAL REMOVAL . . . Soil contaminated with spilled material may be removed by shovels, as well as a variety of heavy equipment such as backhoes and loaders.

CONSEQUENCE

Mechanical equipment used in clean-up operations may become contaminated and present a safety and/or health hazard to response personnel. Any flammable vapors present in the area may be ignited by motorized removal equipment.

MITIGATION

Use equipment constructed of materials compatible with the spilled product. Decontaminate equipment. Continually monitor for presence of flammable vapors.

WATER SPILL

TECHNIQUE

STOP USE . . . Notify downstream industrial, municipal and public users to stop water intake or to monitor water for contamination.

CONSEQUENCE

Alternative water supplies may be needed to be established. Consult environmental specialists for assistance, as needed.

MITIGATION

Provide alternative water supplies as needed until water supply is declared safe.

TECHNIQUE

FLOATING BOOMS/BARRIERS . . . Oil spill confinement booms of compatible material may be deployed. Alternatively, mesh or nets may be strung across stream and anchored every 6-8 feet. Straw or peat placed on upstream side of mesh should absorb and retard spreading of spilled product.

CONSEQUENCE

Leakage may occur under or through barrier if high waves or current present or if not properly deployed. Incompatible materials may be damaged by spilled product. Booms, barrier materials, and deployment equipment may be contaminated. Fire hazards pose risk to response personnel and equipment.

MITIGATION

Proceed with caution. Stage barriers in series where necessary. Recover spilled product as soon as possible. Decontaminate equipment after use. Dispose of waste materials in proper and safe manner. Use compatible equipment. Eliminate ignition sources.

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TECHNIQUE

WATER UNDER-FLOW DAMS . . . Streams may be provided with an under-flow dam. This is a dam made of compacted earth, clay, or other material with open tubes or pipes passing through under water. Upstream ends of pipes or tubes should be well below the layer of floating contaminant. Downstream ends should be at a higher elevation but still below the floating layer. Valves may be installed on downstream ends to control water flow.

CONSEQUENCE

Earthen dams may become saturated with water and seep through or collapse. An insufficient number of under-flow tubes or pipes or additional water may cause overflow.

MITIGATION

Use sufficient number and capacity of tubes or pipes. Be alert for conditions that may lead to overflow, saturation or dam collapse. Remove spilled product as soon as possible.

TECHNIQUE

DIVERSION . . . Where other means are unavailable, floating slicks may be temporarily herded, diverted, or controlled using water hose streams, small boat propeller wash or chemical surface tension modifiers known as spill herders.

CONSEQUENCE

Hose streams and propeller washes have limited applicability and effectiveness. The latter may cause undesired mixing of spilled product and water due to extreme agitation. Chemical spill herders should not be used until approval is obtained from authorized environmental officials.

MITIGATION

Use other means if available.

TECHNIQUE

SURFACE SKIMMING . . . Oil spill skimming devices may be deployed to recover floating petroleum crude oil.

CONSEQUENCE

Incompatible equipment may be damaged. Equipment may be contaminated and pose hazard to future users. Fire hazard may pose risk to response personnel and equipment.

MITIGATION

Decontaminate equipment after use. Use compatible equipment. Store recovered product in safe and secure location. Eliminate ignition sources.

TECHNIQUE

ABSORPTION . . . Straw, hay, peat, or commercial sorbent materials compatible with petroleum crude oil may be used to absorb spilled product from the water surface, preferably after the spill has been confined.

CONSEQUENCE

Once used, sorbent materials pose the same hazards as the spilled product. Their use adds to the overall volume of contaminated material. Deployment and recovery can be difficult. Fire hazards pose risk to response personnel and equipment.

MITIGATION

Deplete accumulated liquid pools with pumps or vacuum trucks if possible before applying sorbents. Decontaminate equipment after use. Store and dispose of waste materials in proper and safe manner. Use compatible equipment. Eliminate ignition sources.