

Product Stewardship Summary

Diethyl Ether

General Statement

Diethyl ether is an extremely flammable organic solvent with many uses. Diethyl ether was one of the first anesthetics developed for surgical use, but has since been replaced by less flammable chemicals. It is used as a solvent in industrial and laboratory applications, and is a key component of many low temperature starter fluids for both gasoline and diesel engines.

Chemical Identity

Name: Diethyl Ether

Brand Names: Valvoline™ Starting Fluid

Chemical name (IUPAC): 1,1'-oxydiethane

CAS number(s): 60-29-7

ES number: 200-467-2

Molecular formula: C₄H₁₀O

Structure:



Uses and Applications

Diethyl ether is commonly used as an industrial or laboratory solvent. At one time, it was also used as a surgical anesthetic. Ashland uses over one million pounds of diethyl ether annually in starting fluid blends for low temperature starting of gasoline or diesel engines under the Valvoline™ brand, as well as packaged for other customers. Diethyl ether has also been identified as a chemical that can be abused.



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Physical/Chemical Properties

Phys/Chem Safety Assessment

Diethyl ether is extremely flammable, even at very low temperatures. In the event of a fire, immediately evacuate the area. Vapors may travel to a source of ignition and flash back. If diethyl ether is exposed to light for a long time, it will form peroxides with the potential to explode when the caps or stoppers are removed from containers.

Property	Value
Form	Clear, Colorless liquid
Physical state	Liquid
Color	Colorless
Odor	Sweet ether odor. Odor detection threshold is 8.9
Density	0.71 g/cm ³ @ 20 °C
Melting / boiling point	-116.2 °C / 34.59 °C
Flammability	H224: Extremely flammable liquid and vapour.
Explosive properties	Not explosive
Self-ignition temperature	175 °C
Vapor pressure	58.96 kPa @ 20 °C
Mol weight	86.17
Water solubility	64.9 g/L @ 20°C
Flash point	- 45 °C
Octanol-water partition coefficient (Log _{kw})	0.83 @ 20 °C

Exposure, Hazard and Safety Assessment

The following section describes possible exposures scenarios and hazards associated with diethyl ether. The exposure assessment describes both the amount of and the frequency with which a chemical substance reaches a person, a population of people, or the environment. Hazard refers to the inherent properties of a substance that make it capable of causing harm to human health or the environment. The safety assessment reports the possibility of a harmful event arising from exposure to a chemical or physical agent under specific conditions. Just because a substance may possess potentially harmful properties does not mean that it automatically poses a risk. It is not possible to make that determination without understanding the exposure.

Human Health Effects

Human Exposure Assessment

Consumer and Worker: Diethyl ether is a significant component in some consumer products. One of the most common uses is as a starting fluid for gasoline and diesel engines. In this application, the starting fluid is typically dispensed from an aerosol can. In aerosol applications, breathing small amounts of diethyl ether is not likely to cause harmful effects. Breathing amounts over recommended exposure levels may be harmful. Some eye and skin contact may be possible from aerosol applications. When used appropriately, negative effects from chronic exposure are not expected. Abuse of this chemical or frequent usage in poorly-ventilated areas may lead to neurological harm.

Diethyl ether has historically been used as a surgical anesthetic, though it has since been replaced by other materials. While diethyl ether is almost never used as an anesthetic in developed countries, it is still common in developing nations. Diethyl ether has also been identified as a chemical with high potential for abuse.

Human Hazard Assessment

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	H302: Harmful if swallowed. H336: May cause drowsiness or dizziness.
Irritation / corrosion Skin / eye / respiratory test	Not classified
Sensitization	Not classified
Toxicity after repeated exposure Oral / inhalation / dermal	Not classified
Genotoxicity / Mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive / Developmental Toxicity	Not classified
Aspiration hazard	Not applicable

Human Health Safety Assessment

Consumer and Worker: Diethyl ether is severely irritating to eyes and mucous membranes, but this irritation is reversible. At high concentrations, diethyl ether causes central nervous system depression. At very high concentrations, diethyl ether can stop breathing and cause death. Diethyl ether is a defatting agent, and repeated exposure may cause skin drying and cracking. In rats, chronic exposure to diethyl ether led to reduction in body weights. Diethyl ether has been shown not to be mutagenic.

Environmental Effects

Environmental Exposures

Diethyl ether is not very soluble in water, and evaporates quickly. No extended environmental exposure is expected.

Environmental Hazard Assessment:

Diethyl ether is not very soluble in water, and evaporates quickly. No significant toxicity to aquatic organisms is expected from diethyl ether.

Effect Assessment	Result
Aquatic toxicity	Not Classified

Fate and behavior	Result
Biodegradation	Not readily biodegradable
Bioaccumulation potential	Low potential to bioaccumulate
PBT / vPvB conclusion	Not PBT or vPvB

Environmental Safety Assessment

No significant toxicity to aquatic organisms is expected from diethyl ether.

Risk Management Recommendations

Do not store diethyl ether in transparent containers. Do not use diethyl ether in enclosed spaces. Do not inhale diethyl ether at concentrations above regulatory limits.

If symptoms such as stomach or intestinal upset; irritation of nose, throat, or airways; central nervous system depression such as dizziness, drowsiness, weakness, fatigue, nausea, headache, or unconsciousness; or heart or breathing rate effects appear, remove to fresh air immediately. If symptoms persist or breathing difficulty is noted, seek medical attention. Do not intentionally inhale diethyl ether. If eye or skin irritation is noted, wash with large amounts of water. If irritation persists or visual difficulty is noticed, seek medical attention. Wash contaminated clothing prior to reuse.

Exposure to diethyl ether in the workplace is covered by established exposure limits. A partial list of references follows:

- US OSHA PEL: 400 ppm (8h TWA)
- ACGIH TLV: 400 ppm (8h TWA)
- EU and member states: <http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm>
- China: 300 mg/m³ (8h TWA)

Regulatory Agency Review

Diethyl ether is listed in:

- is on the list of REACH Registered substances ((EC) 1907/2006)
- is on the US TSCA inventory
- is listed on Canada's DSL list
- is on the Australia Inventory of Chemical Substances
- is on the China Inventory of Existing Chemical Substances
- is on the Japan Inventory of Existing and New Chemical Substances
- is on the Korea Existing Chemicals Inventory
- is on the New Zealand Inventory of Chemicals
- is on the Philippines Inventory of Chemicals and Chemical Substances

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (Extended) SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

GHS Classification:

Flammable liquids: Category 1

Acute toxicity (oral): Category 4

Specific target organ toxicity (single); Category 3 (oral)

Hazard Statements:

H224: Extremely flammable liquid and vapor

H302: Harmful if swallowed

H336: May cause drowsiness or dizziness

Signal Word:

Danger

Precautionary Statements:

P210: Keep away from heat/sparks/open flames/.../hot surfaces. ... No smoking P233: Keep container tightly closed.

P240: Ground/bond container and receiving equipment.

P241: Use explosion-proof electrical/ventilating/lighting/.../equipment P242: Use only non-sparking tools.

P243: Take precautionary measures against static discharge P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

P264: Wash ... thoroughly after handling.

P270: Do not eat, drink or smoke when using this product. P271: Use only outdoors or in a well-ventilated area

P280: Wear protective gloves/protective clothing/eye protection/face protection

P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P330: Rinse mouth.

P370+P378: In case of fire: Use ... for extinction.

P403+P233: Store in a well-ventilated place. Keep container tightly closed.

P403+P235: Store in a well-ventilated place. Keep cool. P405: Store locked up.

P501: Dispose of contents/container to ...

Hazard Pictograms:



Conclusion

Diethyl ether is safe when used properly. Intentional overexposure to diethyl ether may cause adverse health effects. When working with diethyl ether, care must be taken to manage the risks associated with flammability.

Contact Information with Company

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Date of Issue: December 15, 2018

Revision: 2

Additional Information

For more information on GHS, visit <http://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf> or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.
Ashland product stewardship summaries are located at <http://www.ashland.com/sustainability/product/product-stewardship>

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REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market, and is specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by Ashland.

Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether or not their substances are in compliance.