SECTION 1: Identification

1.1 GHS Product identifier

Product name Oxydiethylene dinitrate

1.2 Other means of identification

Product number -
Other names Oxydiethylene dinitrate; Diethyleneglycol dinitrate; O,O'-Dinitro-diaethylenglykol

1.3 Recommended use of the chemical and restrictions on use

Identified uses Industrial and scientific research uses.
Uses advised against no data available

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Explosives, Division 1.1
Acute toxicity - Category 2, Oral
Acute toxicity - Category 1, Dermal
Acute toxicity - Category 2, Inhalation
Specific target organ toxicity â€“ repeated exposure, Category 2
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 3

2.2 GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger

Hazard statement(s)
H201 Explosive; mass explosion hazard
H300 Fatal if swallowed
H310 Fatal in contact with skin
H330 Fatal if inhaled
H373 May cause damage to organs through prolonged or repeated exposure
H412 Harmful to aquatic life with long lasting effects

Precautionary statement(s)

Prevention
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P230 Keep wetted with ...
P234 Keep only in original packaging.
P240 Ground and bond container and receiving equipment.
P250 Do not subject to grinding/shock/friction/â€¦.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P264 Wash ... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P262 Do not get in eyes, on skin, or on clothing.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.
P273 Avoid release to the environment.

Response
P370+P372+P380+P373 In case of fire: Explosion risk. Evacuate area. DO NOT fight fire when fire reaches explosives.
P301+P316 IF SWALLOWED: Get emergency medical help immediately.
P321 Specific treatment (see ... on this label).
P330 Rinse mouth.
P302+P352 IF ON SKIN: Wash with plenty of water/...
P316 Get emergency medical help immediately.
P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P320 Specific treatment is urgent (see ... on this label).
P319 Get medical help if you feel unwell.

Storage
P401 Store in accordance withâ€¦
P405 Store locked up.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal
P503 Refer to manufacturer/supplierâ€¦ for information on disposal/recovery/recycling.
P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Oxydiethylene dinitrate	Oxydiethylene dinitrate	693-21-0	211-745-8	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer for medical attention.

Following skin contact

Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention .

4.2 Most important symptoms/effects, acute and delayed

Excerpt from ERG Guide 112 [Explosives* - Division 1.1, 1.2, 1.3 or 1.5]: Fire may produce irritating, corrosive and/or toxic gases. (ERG, 2016)

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. Ethylene glycol, glycols, and related compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Powder, water spray, foam, carbon dioxide. Note: Evacuate area, fight fires only from an explosion-resistant location ... Cool drums, etc., by spraying with water but avoid contact of the substance with water.

5.2 Specific hazards arising from the chemical

Excerpt from ERG Guide 112 [Explosives* - Division 1.1, 1.2, 1.3 or 1.5]: MAY EXPLODE AND THROW FRAGMENTS 1600 METERS (1 MILE) OR MORE IF FIRE REACHES CARGO. For information on "Compatibility Group" letters, refer to Glossary section. (ERG, 2016)

5.3 Special protective actions for fire-fighters

Use water spray, powder, foam, carbon dioxide. Evacuate area, fight fires only from an explosion-resistant location. In case of fire: keep drums, etc., cool by spraying with water. NO direct contact with water. Combat fire from a sheltered position.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

6.2 Environmental precautions

Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT let this chemical enter the environment. Personal protection: complete protective clothing including self-contained breathing apparatus.

6.3 Methods and materials for containment and cleaning up

Evacuate danger area! Consult an expert! Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: complete protective clothing including self-contained breathing apparatus.)

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames, NO sparks and NO smoking. Prevent build-up of electrostatic charges (e.g., by grounding). Use non-sparking handtools. Do NOT expose to friction or shock. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Fireproof. Store in a separate building. Separated from acids and food and feedstuffs. Cool. Well closed.Fireproof. Store in separate building. Separated from acids, food and feedstuffs . Cool. Well closed.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

MAK skin absorption (H)

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Diethylene glycol dinitrate is a liquid. Extremely sensitive explosive if not properly desensitized with a phlegmatizer. Slightly soluble in alcohol and soluble in ether. Slightly toxic by ingestion. May explode under prolonged exposure to heat or fire or from sudden shock. The primary hazard is the blast effect of an instantaneous explosion and not flying projectiles and fragments . Used as a rocket propellant.
Colour	Liquid
Odour	no data available
Melting point/freezing point	2(ç¨³å®šä½“)ÂºC
Boiling point or initial boiling point and boiling range	161 deg C
Flammability	Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper explosion limit/flammability limit	no data available
Flash point	no data available
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	In water, 3.9X10+3 mg/L at 25 deg C
Partition coefficient n-octanol/water	log Kow = 0.98
Vapour pressure	5.9X10-3 mm Hg at 25 deg C
Density and/or relative density	1.38
Relative vapour density	6.76 (Air = 1)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Heating may cause violent combustion or explosion. May decompose explosively on shock, friction or concussion. On combustion, forms toxic fumes of nitrogen oxides. Reacts with acids.

10.2 Chemical stability

no data available

10.3 Possibility of hazardous reactions

A dangerous fire hazard when exposed to heat or flame.As a result of flow, agitation, etc., electrostatic charges can be generated.Nitroorganics, such as DIETHYLENE GLYCOL DINITRATE, range from slight to strong oxidizing agents. If mixed with reducing agents, including hydrides, sulfides and nitrides, they may begin a vigorous reaction that culminates in a detonation. Nitroalkanes are milder oxidizing agents, but still react violently with reducing agents at higher temperature and pressures. Nitroalkanes react with inorganic bases to form explosive salts. The presence of metal oxides increases the thermal sensitivity of nitroalkanes. Nitroalkanes with more than one nitro group are generally explosive.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Can react vigorously with oxidizing or reducing materials.

10.6 Hazardous decomposition products

Upon decomposition it emits toxic fumes of /nitroxides/.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat male oral gavage 990 mg/kg
- Inhalation: no data available
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Classification - D; not classifiable as to human carcinogenicity Basis - No human or animal carcinogenic studies found in the available literature. Based on former classification system

Reproductive toxicity

no data available

STOT-single exposure

The substance may cause effects on the cardiovascular system, central nervous system and blood. This may result in impaired functions and the formation of methaemoglobin. The effects may be delayed. Medical observation is indicated.

STOT-repeated exposure

The substance may have effects on the cardiovascular system. This may result in cardiac disorders.

Aspiration hazard

A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20Â°C.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: no data available
- Toxicity to daphnia and other aquatic invertebrates: no data available
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: Aliphatic nitric acid esters undergo aerobic biodegradation readily via successive removal of nitrate groups to isomeric derivatives. Nitrate esters undergo microbial metabolism by cleaving the nitrate ester group(1). An unspecified amount of diethylene glycol dinitrate was nearly completely degraded in less than 35 days when incubated in diethylene glycol dinitrate-contaminated water enhanced with the addition of yeast and glucose. Degradation in pure water was minimal, suggesting that degradation may occur in acclimated environments(SRC). Loss in combinations of sterile, nonsterile, aerobic and anaerobic river and pond sediments was all within 21 days, suggesting abiotic processes. Degradation in dry soil was slow with 16 and 24% loss after 5 weeks in sterile and nonsterile soil,

respectively following the addition of 20 ppm test chemical. Using activated sludge enhanced with mineral salts, oxygen, and ethanol, diethylene glycol dinitrate was shown to degrade by hydrolytic cleavage to porducts including diethylene glycol mononitrate and diethyle glycol(2) and to finally carbon dioxide and methane(3).

12.3 Bioaccumulative potential

An estimated BCF of 3.2 was calculated in fish for diethylene glycol dinitrate(SRC), using a log Kow of 0.98(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

12.4 Mobility in soil

The Koc of diethylene glycol dinitrate is estimated as 32(SRC), using a log Kow of 0.98(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that diethylene glycol dinitrate is expected to have very high mobility in soil. The sorption partition coefficients, Kp, were calculated as 2.3 and 0.8 g/mL for EPA-5 sediment (33.6% sand, 31.0% clay, and 35.4% silt at pH 7.44) and EPA-18 sediment (34.6% sand, 39.5% clay, and 25.8% silt at pH 7.76), respectively; these correspond to Koc values of 100 and 120 g/mL, respectively(1).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: UN0075 (For reference only, please check.)

IMDG: UN0075 (For reference only, please check.)

IATA: UN0075 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25% non-volatile, water-insoluble phlegmatizer, by massâ€ (For reference only, please check.)

IMDG: DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25% non-volatile, water-insoluble phlegmatizer, by massâ€ (For reference only, please check.)

IATA: DIETHYLENEGLYCOL DINITRATE, DESENSITIZED with not less than 25% non-volatile, water-insoluble phlegmatizer, by massâ€ (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 1.1D (For reference only, please check.)

IMDG: 1.1D (For reference only, please check.)

IATA: 1.1D (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: (For reference only, please check.)

IMDG: (For reference only, please check.)

IATA: (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Oxydiethylene dinitrate	Oxydiethylene dinitrate	693-21-0	211-745-8
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Listed.
China Catalog of Hazardous chemicals 2015			Listed.

New Zealand Inventory of Chemicals (NZIoC)	Not Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	Not Listed.
Vietnam National Chemical Inventory	Not Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)	Not Listed.
Korea Existing Chemicals List (KECL)	Listed.

SECTION 16: Other information

Information on revision

Creation Date	July 15, 2019
Revision Date	July 15, 2019

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home
- HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
- IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple
- ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg
- Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp
- ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

Use of alcoholic beverages enhances the harmful effect.Depending on the degree of exposure, periodic medical examination is suggested.Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available.Rinse contaminated clothing with plenty of water because of fire hazard.