

P503 Refer to manufacturer/supplierâ€s 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
Glycerol trinitrate	Glycerol trinitrate	55-63-0	200-240-8	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. Refer immediately for medical attention.

4.2 Most important symptoms/effects, acute and delayed

Exposure Routes: inhalation, skin absorption, ingestion, skin and/or eye contact Symptoms: Throbbing headache; dizziness; nausea, vomiting, abdominal pain; hypotension; flush; palpitations; methemoglobinemia; delirium, central nervous system depression; angina; skin irritation Target Organs: cardiovascular system, blood, skin, central nervous system (NIOSH, 2016)

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Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]: Inhalation or contact with material may irritate or burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control may cause pollution. (ERG, 2016)

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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

Maintain an open airway and assist ventilation if necessary. Administer supplemental oxygen. Treat hypotension with supine positioning, intravenous crystalloid fluids, and low-dose pressors if needed. Administer activated charcoal.

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

If material on fire or involved in fire: Dangerously explosive. Do not fight fires in a cargo of explosives. Evacuate area and let burn. If the material is on fire or involved in fire consider evacuation of one mile radius.

5.2 Specific hazards arising from the chemical

Excerpt from ERG Guide 113 [Flammable Solids - Toxic (Wet/Desensitized Explosive)]: Flammable/combustible material. May be ignited by heat, sparks or flames. DRIED OUT material may explode if exposed to heat, flame, friction or shock; treat as an explosive, refer to ERG Guide 112. Keep material wet with water or treat as an explosive, refer to ERG Guide 112. Runoff to sewer may create fire or explosion hazard. (ERG, 2016)

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)

Excerpt from ERG Guide 127 [Flammable Liquids (Water-Miscible)]: HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. (ERG, 2016)

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5.3 Special protective actions for fire-fighters

Use water spray, powder, foam, carbon dioxide. In case of fire: keep drums, etc., cool by spraying 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! Personal protection: complete protective clothing including self-contained breathing apparatus. Remove all ignition sources. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. 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.

6.2 Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Remove all ignition sources. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. 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.

6.3 Methods and materials for containment and cleaning up

Nitro-compounds and nitrate ester are cathodically reduced from industrial wastewaters.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames, NO sparks and NO smoking. NO contact with hot surfaces. Closed system, ventilation, explosion-proof electrical equipment and lighting. 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

Store only if stabilized. Store in an area without drain or sewer access. Fireproof. Well closed. Separated from food and feedstuffs. Nitroglycerin injections are practically colorless and stable in their intact containers. The solutions are not explosive. Storage should be at room temperature; the containers should be protected from freezing. Exposure to light, even high intensity light, does not adversely affect nitroglycerin stability. nitroglycerin injections

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 0.05 ppm as TWA; (skin). MAK: 0.094 mg/m³, 0.01 ppm; peak limitation category: II(1); skin absorption (H); carcinogen category: 3B; pregnancy risk group: C. EU-OEL: 0.095 mg/m³, 0.01 ppm as TWA; 0.19 mg/m³, 0.02 ppm as STEL; (skin)

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	Glyceryl trinitrate solution is a colorless solution of glyceryl trinitrate (nitroglycerin) in water. If allowed to dry out, the remaining nitroglycerin is explosive.
Colour	VISCOUS LIQUID
Odour	no data available
Melting point/freezing point	144 - 146Â°C

Boiling point or initial boiling point and boiling range	295.8Â°C at 760 mmHg
Flammability	Explosive Liquid
Lower and upper explosion limit/flammability limit	no data available
Flash point	12Â°C
Auto-ignition temperature	270 DEG C (518 DEG F)
Decomposition temperature	50-60Â°C
pH	no data available
Kinematic viscosity	36.0 centipoise @ 20 deg C
Solubility	0.1 % (NIOSH, 2016)
Partition coefficient n-octanol/water	1.62
Vapour pressure	0.0003 mm Hg (NIOSH, 2016)
Density and/or relative density	1.671 g/cm3
Relative vapour density	7.8 (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 including nitrogen oxides. Reacts with ozone. This generates explosion hazard.

10.2 Chemical stability

Tablets of nitroglycerin are stable but should be dispensed in glass containers and protected from moisture, light and extremes of temperature.

10.3 Possibility of hazardous reactions

GLYCERYL TRINITRATE SOLUTION is incompatible with the following: Heat, ozone, shock, acids. Note: An OSHA Class A Explosive (1910.109). (NIOSH, 2016). It may react vigorously with reducing agents, including hydrides, sulfides and nitrides. Incompatible with ozone, acids.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Heat, ozone, shock acids.

10.6 Hazardous decomposition products

Begins to decompose at 50-60 deg C, appreciable volatile at 100 deg C evolves nitrous yellow vapors at 135 deg C.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat oral (male) 822 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

no data available

Reproductive toxicity

no data available

STOT-single exposure

The substance is irritating to the eyes. The substance may cause effects on the cardiovascular system. This may result in lowering of blood pressure. Medical observation is indicated.

STOT-repeated exposure

Repeated or prolonged contact with skin may cause dermatitis. Repeated exposure leads to marked tolerance and short absence from exposure may lead to sudden death.

Aspiration hazard

A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50 Bluegill 1.28 mg/l/96 hr @ pH 6.0. /Static bioassay
- 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

Nitroglycerin and other aliphatic nitric acid esters undergo aerobic biodegradation readily via successive removal of nitrate groups to isomeric derivatives(1). Contrary to some earlier reports that it was recalcitrant to biodegradation, nitroglycerin proved to be readily biodegradable in batch and continuous tests(2). Results of the shake flask test that was run at 30 deg C with an activated sludge inoculum showed a 53.6% loss of nitroglycerin in 5 days(2). In a continuous bench-scale activated sludge apparatus, a mean reduction of 92.2% was obtained(2). The apparatus was run at room temperature and the residence time was 84 hr. 1,3-Dinitroglycerol and 1,2-dinitroglycerol were identified at intermediate stages of the process, but they were also essentially absent from the effluent(2). The third experiment employing a chemostat, a continuous culture, aerobic system with no solids recycling, was designed to simulate a plant where propellant wastes would be treated. After a 8-15 hr detention period, no nitrate esters were detectable in the effluent(2). It was found that nitroglycerin is not suitable as a source of carbon and nitrogen so nutrients are essential(2). It was speculated that the earlier experiments which showed nitroglycerin to be recalcitrant were conducted using concns of nitroglycerin that were toxic to the microorganisms(2).

12.3 Bioaccumulative potential

An estimated BCF of 4 was calculated for nitroglycerin(SRC), using a log Kow of 1.62(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 nitroglycerin is estimated as 180(SRC), using a log Kow of 1.62(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that nitroglycerin is expected to have moderate mobility in soil(SRC).

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: UN0143 (For reference only, please check.) IMDG: UN0143 (For reference only, please check.) IATA: UN0143 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: NITROGLYCERIN, DESENSITIZED with not less than 40% non-volatile water-insoluble phlegmatizer, by mass (For reference only, please check.)	IMDG: NITROGLYCERIN, DESENSITIZED with not less than 40% non-volatile water-insoluble phlegmatizer, by mass (For reference only, please check.)	IATA: NITROGLYCERIN, DESENSITIZED with not less than 40% non-volatile water-insoluble phlegmatizer, by mass (For reference only, please check.)
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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.)
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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: Yes

IMDG: Yes

IATA: Yes

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
Glycerol trinitrate	Glycerol trinitrate	55-63-0	200-240-8
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)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			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

Combustion in a confined space may turn into detonation. Use of alcoholic beverages enhances the harmful effect. Other UN numbers are: UN 0144 Nitroglycerin, solution in alcohol with more than 1% but not more than 10% nitroglycerin; UN Haz Class 1.1D. UN 1204 Nitroglycerin, solution in alcohol with not more than 1% of nitroglycerin; UN Haz Class 3, Pack Group II. UN 3064 Nitroglycerin, solution in alcohol with more than 1% but not more than 5% of nitroglycerin, UN Haz Class 3, Pack Group II. An added stabilizer or inhibitor can influence the toxicological properties of this substance; consult an expert.