SECTION 1: Identification

1.1 GHS Product identifier

Product name Ethylene dinitrate

1.2 Other means of identification

Product number -
Other names ethane-1,2-diyl dinitrate; 1,2-dinitrooxy-ethane; Ethylene glycol,dinitrate

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, Unstable explosive
Acute toxicity - Category 2, Oral
Acute toxicity - Category 1, Dermal
Acute toxicity - Category 2, Inhalation
Specific target organ toxicity â€“ repeated exposure, Category 2

2.2 GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger
Hazard statement(s)
H200 Unstable explosive
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

Precautionary statement(s)

Prevention
P203 Obtain, read and follow all safety instructions before use.
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.

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
Ethylene dinitrate	Ethylene dinitrate	628-96-6	211-063-0	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. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer 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, angina; methemoglobinemia; delirium, central nervous system depression; irritation skin Target Organs: Skin, cardiovascular system, blood, liver, kidneys (NIOSH, 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. Nitrates, nitrites, and related compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Evacuate area of fire ... Fight fires only from a secure, explosion-resistant position ... Use dry chemical, carbon dioxide, water spray, or foam extinguishers. Vapors are heavier than air and will collect in low areas. Vapors may travel long distances to ignition sources and flashback. Vapors in confined areas may explode when exposed to fire. Containers may explode in fire. Storage containers and parts of containers may rocket great distances, in many directions. If material or contaminated runoff enters waterways, notify downstream health and fire officials and pollution control agencies. From a secure, explosion-proof location, use water spray to cool exposed containers. If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure position.

5.2 Specific hazards arising from the chemical

Gives off irritating or toxic fumes (or gases) in a fire. Risk of fire and explosion. Explosive.

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! Personal protection: complete protective clothing including self-contained breathing apparatus. 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. 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

Spread sodium bisulfate over the area and sprinkle with water. Then flush to sewer with water. Evacuate and restrict persons not wearing protective equipment from area of spill or leak until cleanup is complete. Remove all ignition sources. Ventilate area of spill or leak. Absorb liquids in vermiculite, dry sand, earth, peat, carbon, or a similar material and deposit in sealed containers. Keep EGDN out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations. It may be necessary to contain and dispose of this chemical as a hazardous waste. If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Contact your Department of Environmental protection or your regional office of the federal EPA for specific recommendations.

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.Buildings used for storage of nitroglycerin or ethylene glycol dinitrate shall be separated by at least the minimum distances required; containers of nitroglycerin or ehylene glycol dinitrate shall be kept tightly closed at all times when not in use and shall be stored in a manner that will minimized the risk of spills; only properly informed, trained, and equipped personnel shall be involved in storing, loading, and unloading, or processing liquid nitroglycerin, ethylene glycol dinitrate, or explosive mixtures containing these compounds. Also, storage areas for nitroglycerin or ethylene glycol dinitrate shall be clean, dry, and well ventilated. Storage areas for explosive forms of nitroglycerin or ethylene glycol dinitrate shall be in a structure that is bullet resistant, weather resistant, and ventilated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 0.05 ppm as TWA; (skin).MAK: 0.063 mg/m3, 0.01 ppm; peak limitation category: II(1); skin absorption (H); pregnancy risk group: C

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	Ethylene glycol dinitrate is a colorless to yellow, oily odorless liquid with a sweetish taste. Mp: -22Â°C; bp: explodes at 114Â°C. Density: 1.49 g cm-3. Soluble in water (23.3 g/L H2O) at 25Â°C). Very soluble in ethanol and in ether. Used as an explosive ingredient in dynamite along with nitroglycerine. Toxic; can penetrate the skin.
Colour	Colorless to yellow, oily ... liquid [Note: An explosive ingredient (60-80%) in dynamite along with nitroglycerine (40-20%)].
Odour	Odorless
Melting point/freezing point	-8Â° F (NIOSH, 2016)
Boiling point or initial boiling point and boiling range	387Â° F at 760 mm Hg (NIOSH, 2016)
Flammability	Explosive Liquid
Lower and upper explosion limit/flammability limit	no data available
Flash point	419Â° F (NIOSH, 2016)
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	4.2 mPa.s at 20 deg C
Solubility	Insoluble (NIOSH, 2016)
Partition coefficient n-octanol/water	log Kow = 1.16
Vapour pressure	0.05 mm Hg (NIOSH, 2016)
Density and/or relative density	1.49 (NIOSH, 2016)
Relative vapour density	5.25 (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

Combustible liquid.ETHYLENE GLYCOL DINITRATE is explosive. Acts as a strong oxidizing agent. Heating to 114Â°C or above may cause a violent combustion or explosion producing toxic fumes (nitrogen oxides). May also decompose explosively from shock, friction or from a build-up of electrostatic charge that sparks suddenly to ground. Can begin a vigorous reaction that culminates in an explosion if mixed with reducing agents including hydrides, sulfides, and nitrides and numerous ordinary combustible materials. Reacts violently with Al, BP, cyanides, esters, PN2H, P, NaCN, SnCl2, sodium hypophosphite, and thiocyanates. Reacts with acids and with alkalis, including ammonia and amines. Must be stored in a cool, ventilated place, away from acute fire hazards and easily oxidized materials (Sax and Lewis, 1987 p.664).

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Not compatible with strong acids and alkalies.

10.6 Hazardous decomposition products

Decomposes violently upon heating or impact with a force similar to that of nitroglycerin.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat oral 616 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 may cause effects on the cardiovascular system. This may result in sudden lowering of blood pressure. The substance may cause effects on the blood. This may result in the formation of methaemoglobin. Medical observation is indicated. The effects may be delayed.

STOT-repeated exposure

Repeated exposure leads to marked tolerance and short absence from exposure may lead to sudden death. Repeated exposure leads to marked tolerance and short absence from exposure may lead to sudden death.

Aspiration hazard

A harmful contamination of the air can be reached rather quickly 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

PURE CULTURE: Ethylene glycol dinitrate was biodegraded to ethylene glycol mononitrate at a rate of 6.32 umol/hr/mg by Klebsiella oxytoca(1).

12.3 Bioaccumulative potential

An estimated BCF of 3 was calculated in fish for ethylene glycol dinitrate(SRC), using a log Kow of 1.16(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

Using a structure estimation method based on molecular connectivity indices(1), the Koc of ethylene glycol dinitrate can be estimated to be 40(SRC). According to a classification scheme(2), this estimated Koc value suggests that ethylene glycol dinitrate is expected to have very high mobility in soil.

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: no data available IMDG: no data available IATA: no data available

14.2 UN Proper Shipping Name

ADR/RID: no data available IMDG: no data available IATA: no data available

14.3 Transport hazard class(es)

ADR/RID: 6.1 (For reference only, please check.) IMDG: 6.1 (For reference only, please check.) IATA: 6.1 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: II (For reference only, please check.) IMDG: II (For reference only, please check.) IATA: II (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
Ethylene dinitrate	Ethylene dinitrate	628-96-6	211-063-0
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			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			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

Symptoms such as chest pains or palpitations that can develop during periods away from work may be indicative of toxicity of the substance and should be reported immediately to the responsible physician.Use of alcoholic beverages enhances the harmful effect.Rinse contaminated clothing with plenty of water because of fire hazard.Do NOT take working clothes home.Depending on the degree of exposure, periodic medical examination is indicated.Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available.