

SAFETY DATA SHEETS

According to the UN GHS revision 10

Version: 1.1
Creation Date: July 15, 2024
Revision Date: February 08, 2025

SECTION 1: Identification

1.1 GHS Product identifier

Product name RDX

1.2 Other means of identification

Product number C1118644

Other names Geksogen; cyclo-trimethylene-trinitramine; 1,3,5-trinitro-1,3,5-triazinane

1.3 Recommended use of the chemical and restrictions on use

Identified uses For laboratory and Industrial use only.

Uses advised against no data available

1.4 Supplier's details

Company CATO Research Chemicals Inc.

Address 3/F,Building B,No.179 BASIGO, Guangpu Rd East,Huangpu Dist,Guangzhou

Telephone +86-20-81960175

1.5 Emergency phone number

Emergency phone number +86-20-81960175

Service hours 'Monday to Friday, 9am-5pm (Standard time zone: UTC/GMT +8 hours).

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Acute toxicity - Category 3, Oral

Specific target organ toxicity – single exposure, Category 1

Specific target organ toxicity – repeated exposure, Category 2

2.2 GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H201 Explosive; mass explosion hazard

H301 Toxic if swallowed

H370 Causes damage to organs

H373 May cause damage to organs through prolonged or repeated exposure

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

Response

P301+P316 IF SWALLOWED: Get emergency medical help immediately.

P321 Specific treatment (see ... on this label).

P330 Rinse mouth.

P308+P316 IF exposed or concerned: Get emergency medical help immediately.

P319 Get medical help if you feel unwell.

Storage

P405 Store locked up.

Disposal

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
RDX	Perhydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	204-500-1	~ 99%

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.

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. Do NOT induce vomiting. 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: Irritation eyes, skin; headache, irritability, lassitude (weakness, exhaustion), tremor, nausea, dizziness, vomiting, insomnia, convulsions Target Organs: Eyes, skin, central nervous system (NIOSH, 2016)
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. Explosives

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.

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)
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 in large amounts, powder, carbon dioxide. Combat fire from a sheltered position. In case of fire: keep drums, etc., cool by spraying with water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Remove all ignition sources. Do NOT let this chemical enter the environment.

6.2 Environmental precautions

Evacuate danger area! Consult an expert! Remove all ignition sources. Do NOT let this chemical enter the environment.

6.3 Methods and materials for containment and cleaning up

After covering the spills with soda ash, mix, & spray with water. Scoop into a bucket of water and let it stand for 2 hr. Neutralize with 6 molar hydrochloric acid.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

NO open flames, NO sparks and NO smoking. Do NOT expose to friction or shock. Closed system, dust explosion-proof electrical equipment and lighting. Prevent deposition of dust. 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

Substance should be kept wet. Fireproof. Well closed. Separated from combustible substances and strong oxidizers. Store in an area without drain or sewer access. Store only in a permanent magazine. Protect container against physical damage. Store away from initiator explosives. Separate from oxidizing materials, combustibles & sources of heat.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: 0.5 mg/m³, as TWA; (skin); A4 (not classifiable as a human carcinogen)

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 safety goggles or eye protection in combination with breathing protection if powder.

Skin protection

Protective gloves.

Respiratory protection

Use closed system or ventilation.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Cyclotrimethylene trinitramine is an explosive. The explosion can be initiated by a sudden shock, high temperature or a combination of the two. The primary hazard is from blast effect and not from flying projectiles and fragments. Under prolonged exposure to heat or fire they can explode.
Colour	White, crystalline powder
Odour	no data available
Melting point/freezing point	205°C
Boiling point or initial boiling point and boiling range	747°C at 760mmHg
Flammability	Combustible Solid [EXPLOSIVE!]
Lower and upper explosion limit/flammability limit	no data available
Flash point	405.6°C
Auto-ignition temperature	no data available
Decomposition temperature	no data available
pH	no data available
Kinematic viscosity	no data available
Solubility	Insoluble (NIOSH, 2016)
Partition coefficient n-octanol/water	log Kow = 0.87
Vapour pressure	2.66E-21mmHg at 25°C
Density and/or relative density	1.89g/cm ³
Relative vapour density	no data available
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

May decompose explosively on shock, friction or concussion. May explode on heating. This produces nitrogen oxides. Reacts with strong oxidants and combustible substances.

10.2 Chemical stability

The stability of cyclonite is considerably superior to that of PETN /pentaerythritol tetranitrate/ and nearly equal to TNT. It withstands storage at 85 deg C for 10 months or at 100 deg C for 100 hr without measurable deterioration.

10.3 Possibility of hazardous reactions

Dangerous due to fire ... hazard. /nitrates/CYCLOTRIMETHYLENE TRINITRAMINE is incompatible with strong oxidizing agents, combustible materials and heat. Detonates on contact with mercury fulminate (NIOSH, 2016). Danger of explosion when dry. The self heating and explosive decomposition of the explosive and aqueous alkali (calcium hydroxide) has been studied, [Chem Abs., 1988, 109, 112968].

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

During the preparation of 1-acetylhexahydro-3,5-dinitro-1,3,5-triazine, a contaminant formed during the manufacture of RDX, a mixture consisting of 3:1 molar ratio of nitric acid:1,3-triacetylhexahydro-1,3,5-triazine in trifluoroacetic anhydride detonated without warning.

10.6 Hazardous decomposition products

When heated to decomposition it emits toxic fumes of/nitrogen oxides/.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Mouse oral 59 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: C; possible human carcinogen. BASIS FOR CLASSIFICATION: Hepatocellular adenomas and carcinomas in female B6C3F1 mice. HUMAN CARCINOGENICITY DATA: None.

Reproductive toxicity

no data available

STOT-single exposure

The substance may cause effects on the central nervous system. This may result in irritability, insomnia, convulsions and unconsciousness.

STOT-repeated exposure

The substance may have effects on the central nervous system. Repeated or prolonged contact with skin may cause dermatitis.

Aspiration hazard

A harmful concentration of airborne particles can be reached quickly.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50; Species: *Lepomis macrochirus* (Bluegill); Conditions: static, pH 6.0; Concentration: 3.6 mg/L for 96 hr (95% confidence interval: 1.9-6.6 mg/L)
- Toxicity to daphnia and other aquatic invertebrates: LC50; Species: *Daphnia magna* (Water flea); Conditions: flow through; Concentration: >15 mg/L for 96 hr
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

AEROBIC: Cyclonite was found to be resistant to aerobic degradation using inocula from a variety of sources(1-3). In a 70-liter biological treatment simulator, cyclonite underwent 14% degradation in 5 days using an activated sludge inoculum(4). Aerobic soil cultures containing cyclonite at 30 ppm, plus added potato starch as a supplemental carbon source, were not able to degrade cyclonite even after 24 days of incubation(5). In the treatment of a wastewater containing cyclonite and TNT, only a small amount of the cyclonite was removed in an aerobic static biological reactor, followed by removal of >85% of the cyclonite in a contact oxidation reactor(6). Cyclonite, added to 3 different soil samples and incubated for 56 days under aerobic conditions was not biodegraded(7). Cyclonite was not degraded following 90 days incubation with water from the Holston River(8).

12.3 Bioaccumulative potential

Bioconcentration in bluegill sunfish /*Lepomis macrochirus*/, channel catfish /*Ictalurus punctatus*/, and fathead minnow /*Pimephales promelas*/ was measured for cyclonite concentrations of 0.014 and 1.0 mg/L(1). The bioconcentration factors in edible tissue at the lower

concentration ranged from 4.0 in catfish to 5.9 in fathead minnow and were slightly higher in viscera (5 in catfish to 11 in fathead minnows)(1). Elimination of all cyclonite from the fish tissues at the low dose exposure occurred after 14 days in the bluegill and catfish but not totally in the minnow. At the higher dose, minnows and catfish eliminated 70-84% of the accumulated cyclonite but no elimination occurred in the bluegill(1). The BCFs of cyclonite in sheepshead minnows (*Cyprinodon variegatus*) are reported as 1.0, 2.1, 1.6, 0.6 and 0.7 in the liver, viscera, gills, body remains and whole body, respectively, exposed for 24 hours at a cyclonite concentration of 8.11-8.14 mg/L(2). According to a classification scheme(3), these BCF values suggest that bioconcentration in aquatic organisms is low(SRC).

12.4 Mobility in soil

Downward movement of rdx through intact soil columns showed very little detectable movement of the munition compound or its transformation products in this time frame. the study was conducted for 6 mo. soil samples were taken at selected intervals in the soil profiles with an oakfield sampler.

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: UN0072 (For reference only, please check.) IMDG: UN0072 (For reference only, please check.) IATA: UN0072 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX), WETTED with not less than 15% water, by mass† (For reference only, please check.) IMDG: CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX), WETTED with not less than 15% water, by mass† (For reference only, please check.) IATA: CYCLOTRIMETHYLENE-TRINITRAMINE (CYCLONITE; HEXOGEN; RDX), WETTED with not less than 15% water, by mass† (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
Perhydro-1,3,5-trinitro-1,3,5-triazine	Perhydro-1,3,5-trinitro-1,3,5-triazine	121-82-4	204-500-1
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)	Not Listed.
Vietnam National Chemical Inventory	Listed.
Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)	Listed.
Korea Existing Chemicals List (KECL)	Listed.

SECTION 16: Other information

Information on revision

Creation Date July 15, 2024
Revision Date February 08, 2025

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

Do NOT take working clothes home. The technical product may contain impurities which alter the health effects. The substance can only be transported either as UN 0072: CYCLOTIMETHYLENE-TRINITRAMINE(CYCLONITE; HEXOGEN; RDX), WETTED with not less than 15% water, by mass; or as UN 0483 CYCLOTIMETHYLENE-TRINITRAMINE(CYCLONITE; HEXOGEN; RDX), DESENSITIZED

Any questions regarding this SDS, Please send your inquiry to info@cato-chem.com

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