

# SAFETY DATA SHEET

## RDX

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

|               |            |
|---------------|------------|
| Date issued   | 06.01.2011 |
| Revision date | 29.10.2013 |

#### 1.1. Product identifier

|               |   |
|---------------|---|
| Product name  | RDX   |
| Chemical name | Cyclotrimethylenetrinitramine                               |
| REACH Reg No. | 01-2119990795-17-0002                                       |
| CAS no.       | 121-82-4  |
| EC no.        | 204-500-1   |
| Formula       | C <sub>3</sub> H <sub>6</sub> O <sub>6</sub> N <sub>6</sub> |

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

|                                  |  |
|----------------------------------|--|
| Product group                    | Explosives   |
| Use of the substance/preparation | Industrial use, professional use, explosive, ammunition, pyrotechnic articles, Laboratory activities<br>See SECTION 16 for a complete list of uses for which an exposure scenario is provided as an annex. |
| Uses advised against             | No information available.  |

#### 1.3. Details of the supplier of the safety data sheet

##### Manufacturer

|                |   |
|----------------|---|
| Company name   | Chemring Nobel AS   |
| Postal address | Engeneveien 7   |
| Postcode       | N-3475  |
| City           | SÆTRE   |
| Country        | Norway  |
| Tel            | +47 32 27 86 00   |
| E-mail         | Richard.Gjersoe@chemringnobel.no  |
| Website        | <a href="http://www.chemringnobel.no/">http://www.chemringnobel.no/</a> |
| Contact person | Richard Gjersøe   |

#### 1.4. Emergency telephone number

|                     |                                     |
|---------------------|-------------------------------------|
| Emergency telephone | NHS Direct (UK):0845 4647 (24h/24h) |
|---------------------|-------------------------------------|

### SECTION 2: Hazards identification

#### 2.1. Classification of substance or mixture

|  |  |
|--|--|
| Classification according to 67/548/EEC or 1999/45/EC               | Xn; R48/22<br>T; R39/25<br>T; R25<br>E; R2   |
| Classification according to Regulation (EC) No 1272/2008 [CLP/GHS] | Expl. 1.1; H201;<br>Acute tox. 3; H301;<br>STOT SE1; H370;<br>STOT RE2; H373;                                    |
| Substance / mixture hazardous properties                           | Explosive with mass explosion hazard.<br>Toxic if swallowed. Causes damage to organs. May cause damage to organs |

through prolonged or repeated exposure.

## 2.2. Label elements

### Hazard Pictograms (CLP)



|                          |  |
|--------------------------|--|
| Composition on the label | RDX:100 %  |
| Signal word              | Danger   |
| Hazard statements        | H201 Explosive; mass explosion hazard.<br>H301 Toxic if swallowed.<br>H370 Causes damage to organs (Central nervous system by oral exposure)<br>H373 May cause damage to organs (central nervous system) through prolonged or repeated exposure oral   |
| Precautionary statements | P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.<br>P250 Do not subject to grinding/shock/friction.<br>P370 + P380 In case of fire: Evacuate area.<br>P372 Explosion risk in case of fire.<br>P373 DO NOT fight fire when fire reaches explosives.<br>P280 Wear protective gloves/protective clothing/eye protection/face protection.<br>P501 Dispose of contents/container to special handler. |

## 2.3. Other hazards

|               |                   |
|---------------|-------------------|
| PBT / vPvB    | Not PBT / vPvB.   |
| Health effect | May cause spasms. |

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

| Substance | Identification   | Classification  | Contents |
|-----------|--|---|----------|
| RDX       | CAS no.: 121-82-4<br>EC no.: 204-500-1<br>Registration number: 01-2119990795-17-0002 | Xn; R48/22<br>T; R39/25<br>T; R25<br>E; R2<br>Expl. 1.1; H201;<br>Acute tox. 3; H301;<br>STOT SE1; H370;<br>STOT RE2; H373; | 100 %    |

|                            |  |
|----------------------------|--|
| Column headings            | CAS no. = Chemical Abstracts Service; EU (Einecs or Elincs number) = European inventory of Existing Commercial Chemical Substances; Ingredient name = Name as specified in the substance list (substances that are not included in the substance list must be translated, if possible). Contents given in; %, %wt/wt, %vol/wt, %vol/vol, mg/m <sup>3</sup> , ppb, ppm, weight%, vol% |
| HH/HF/HE                   | T+ = Very toxic, T = Toxic, C = Corrosive, Xn = Harmful, Xi = Irritating, E = Explosive, O = Oxidizing, F+ = Extremely flammable, F = Very flammable, N = Environmental hazard   |
| Description of the mixture | Wetted with 15-20 % water.   |
| Substance comments         | See section 16 for explanation of H- and R-phrases listed above.   |

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

|         |  |
|---------|--|
| General | Emergency telephone number: see section 1.4. In case of unconsciousness or severe accidents, call 112. |
|---------|--|

|              |   |
|--------------|---|
|              | IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.<br>IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.<br>Immediately consult a doctor.   |
| Inhalation   | Fresh air and rest. Get medical attention if any discomfort continues.  |
| Skin contact | Remove contaminated clothing. Wash the skin immediately with soap and water. Get medical advice/attention if you feel unwell.   |
| Eye contact  | Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyes wide apart. Get medical advice/attention if you feel unwell.   |
| Ingestion    | Rinse mouth thoroughly. Drink a few glasses of water or milk. Induce vomiting, if person is conscious. Vomiting should be induced only in consultation with medical personnel. Seek medical attention. When risk of unconsciousness, place and transport the victim in secured side position. Transport to hospital. Bring the safety data sheet. |

#### 4.2. Most important symptoms and effects, both acute and delayed

|                                  |  |
|----------------------------------|--|
| Information for health personnel | Ingestion of RDX can cause convulsions similar to epileptic seizures, and should be treated as such. |
| Acute symptoms and effects       | Toxic if swallowed. May cause headache, dizziness, and other central nervous system effects.         |
| Delayed symptoms and effects     | Same as the acute symptoms.  |

#### 4.3. Indication of any immediate medical attention and special treatment needed

|                   |                        |
|-------------------|------------------------|
| Other Information | Treat symptomatically. |
|-------------------|------------------------|

### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

|                              |   |
|------------------------------|---|
| Suitable extinguishing media | Extinguish surrounding fires with suitable extinguisher.  |
| Improper extinguishing media | Do not fight fires involving explosives, risk of explosion! Fire in explosives can not be extinguished with any fire equipment. |

#### 5.2. Special hazards arising from the substance or mixture

|                            |   |
|----------------------------|---|
| Fire and explosion hazards | Explosive by shock, friction, fire or other sources of ignition. By explosion or fire, toxic gases such as nitrogen oxides (NO, NO <sub>2</sub> and N <sub>2</sub> O <sub>4</sub> ) and carbon oxides (CO, CO <sub>2</sub> ) may be formed. |
|----------------------------|---|

#### 5.3. Advice for firefighters

|                               |  |
|-------------------------------|--|
| Personal protective equipment | Use compressed air equipment when the chemical is involved in fire. In case of evacuation, an approved protection mask should be used. See also section 8.   |
| Other Information             | Evacuate all personell to a predetermined safe location.<br>Notify authorities in accordance with emergency response procedures.<br>Containers close to fire should be removed immediately or cooled with water. |

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

|                              |   |
|------------------------------|---|
| Personal protection measures | Use protective equipment as referred to in section 8. |
|------------------------------|---|

#### 6.2. Environmental precautions

|                                      |   |
|--------------------------------------|---|
| Environmental precautionary measures | Do not allow to enter into sewer, water system or soil. |
|--------------------------------------|---|

#### 6.3. Methods and material for containment and cleaning up

|                 |  |
|-----------------|--|
| Cleaning method | Moisten with water before handling. Spillage should be removed with an aluminum or wooden shovel and placed in a suitable container for later burning. |
|-----------------|--|

Dispose of in accordance with local regulations for waste handling (see section 13).

#### 6.4. Reference to other sections

Other instructions See section 7 and 8.

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Handling Only to be handled by authorized personnel. The explosives must be under supervision and unavailable for persons not concerned.  
 Keep away from sources of ignition - No smoking.  
 Protect against heating.  
 Protect against physical damage and/or friction.  
 Avoid inhalation of dust.

### Protective Safety Measures

Advice on general occupational hygiene Wash hands after contact with the chemical. Change contaminated clothing and take off protective equipment before the meal. Do not smoke, drink or eat in the workplace.

### 7.2. Conditions for safe storage, including any incompatibilities

Storage Store dry in a well-ventilated place.  
 Storage room must be locked and secured from fire.  
 Store separated from: igniters.  
 To be stored at temperatures between 0 and 30 °C.

Special risks and properties Explosive by shock and heating.

Other Information Keep wetted with  $\geq 15\%$  water.  
 Comply with national regulation on the handling of explosives.

### Conditions for safe storage

Requirements for storage rooms and vessels Store in approved storage for explosives.

### 7.3. Specific end use(s)

Specific use(s) See section 16.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

Other Information about threshold limit values Contains no substances with occupational exposure limit values.

### 8.2. Exposure controls

Occupational exposure limits Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Provide adequate ventilation.

### Respiratory protection

Respiratory protection Normally not required. Use mask with filter P2 in case of dust formation.

### Hand protection

Hand protection Use suitable protective gloves if risk of skin contact. No special material is recommended, as the chemical will not penetrate plastic or rubber.

### Eye / face protection

Eye protection Use tight fitting goggles if dust is generated.

### Skin protection

Skin protection (except hands) Wear appropriate protective clothing to protect against skin contact.

### Appropriate environmental exposure control

Environmental exposure controls Do not allow to enter into sewer, water system or soil.

## Other Information

Other Information Eye wash facilities should be available when handling this chemical. Contaminated and wet clothing should be changed. The listed protective equipment is a recommendation. A risk assessment of the actual risk may lead to other requirements.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

|   |  |
|---|--|
| Physical state                          | Solid. / Powder.   |
| Colour                                  | White.   |
| Odour                                   | None.  |
| Comments, pH (as supplied)              | Not relevant.  |
| Melting point/melting range             | Value: 190 °C  |
| Comments, Boiling point / boiling range | Not applicable since the substance decomposes without boiling.   |
| Comments, Flash point                   | Not relevant. (Solid)  |
| Comments, Evaporation rate              | Not relevant.  |
| Flammability (solid, gas)               | Waiver. Substance has explosive properties.                      |
| Comments, Vapour pressure               | 1x10 <sup>-9</sup> mm Hg. T = 20 °C                              |
| Comments, Vapour density                | Not relevant.  |
| Specific gravity                        | Value: 1,8 g/cm <sup>3</sup>                                     |
| Solubility in water                     | Insoluble.   |
| Partition coefficient: n-octanol/water  | Value: 0,87<br>Method of testing: Log Pow                        |
| Comments, Spontaneous combustability    | Not relevant.  |
| Decomposition temperature               | Value: 190-200 °C  |
| Comments, Viscosity                     | Not applicable. (Solid at room temperature and normal pressure). |
| Explosive properties                    | Explosive.   |
| Oxidising properties                    | Test not conducted. The substance is explosive.                  |

### 9.2. Other information

#### Other physical and chemical properties

Physical and chemical properties Explosion temperature: 190-200 °C

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Reactivity No reactivity hazards.

### 10.2. Chemical stability

Stability Stable under normal temperature conditions and recommended use.

### 10.3. Possibility of hazardous reactions

Possibility of hazardous reactions Explosive when mixed with oxidizing substances.

### 10.4. Conditions to avoid

Conditions to avoid May detonate with impact, friction or on heating.

### 10.5. Incompatible materials

Materials to avoid Oxidizing agents.

### 10.6. Hazardous decomposition products

Hazardous decomposition products Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours. Nitrous gases (NO<sub>x</sub>).

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

#### Toxicological Information:

|                 |   |
|-----------------|---|
| LD50 oral       | Value: 71 mg/kg<br>Animal test species: Rat |
| LD50 dermal     | Comments: No adverse effect observed.       |
| LC50 inhalation | Comments: No study available.               |

#### Other information regarding health hazards

|         |   |
|---------|---|
| General | Ingestion or inhalation of dust may cause acute or chronic poisoning. Symptoms include headache, seizures, insomnia and nausea. Convulsive seizures may occur several hours after exposure. |
|---------|---|

#### Potential acute effects

|                   |  |
|-------------------|--|
| Inhalation        | Inhalation of dust can cause headaches, seizures, insomnia and nausea. |
| Skin contact      | Not Irritating.  |
| Eye contact       | Not irritating.  |
| Ingestion         | Toxic if swallowed. May cause damage to organs.                        |
| Irritation        | Based on available data, the classification criteria are not met.      |
| Aspiration hazard | Not relevant.  |

#### Delayed effects / repeated exposure

|                        |  |
|------------------------|--|
| Sensitisation          | Based on available data, the classification criteria are not met.  |
| STOT-single exposure   | Causes damage to organs (the central nervous system) if swallowed.   |
| STOT-repeated exposure | May cause damage to organs (the central nervous system) through prolonged or repeated exposure if swallowed. |

#### Carcinogenic, Mutagenic or Reprotoxic

|                        |   |
|------------------------|---|
| Carcinogenicity        | Based on available data, the classification criteria are not met. |
| Mutagenicity           | Based on available data, the classification criteria are not met. |
| Teratogenic properties | Based on available data, the classification criteria are not met. |
| Reproductive toxicity  | Based on available data, the classification criteria are not met. |

## SECTION 12: Ecological information

### 12.1. Toxicity

|                                  |  |
|----------------------------------|--|
| Acute aquatic, fish              | Value: 11,1-15,0 mg/l<br>Method of testing: LC50<br>Fish, species: Pimephales promelas<br>Duration: 96 h |
| Acute aquatic, fish, Comments    | NOEC (28 d): 1,4 mg/l Pimephales promelas  |
| Acute aquatic, algae, Comments   | NOEC: 0,4 mg/l Pseudokirchnerella subcapitata  |
| Acute aquatic, Daphnia           | Value: > 17 mg/l<br>Method of testing: EC50<br>Daphnia, species: Ceriodaphnia dubia<br>Duration: 48 h    |
| Acute aquatic, Daphnia, Comments | NOEC (7 d): 0,5 mg/l Ceriodaphnia dubia  |
| Ecotoxicity                      | The chemical is not classified as harmful to the environment.  |

### 12.2. Persistence and degradability

|                               |   |
|-------------------------------|---|
| Persistence and degradability | Decomposes by photolysis. Half-life 3-13 hours. |
|-------------------------------|---|

### 12.3. Bioaccumulative potential

|                           |  |
|---------------------------|--|
| Bioaccumulative potential | Will not bio-accumulate. Log Pow= 0,87 |
|---------------------------|--|

### 12.4. Mobility in soil

|          |  |
|----------|--|
| Mobility | The product has poor water-solubility. |
|----------|--|

### 12.5. Results of PBT and vPvB assessment

|                         |   |
|-------------------------|---|
| PBT assessment results  | The substance does not meet current criteria for PBT (Persistent, bioaccumulative and toxic).     |
| vPvB evaluation results | The substance does not meet current criteria for vPvB (very persistent and very bioaccumulative). |

## 12.6. Other adverse effects

|                                 |   |
|---------------------------------|---|
| Other adverse effects / Remarks | Do not allow to enter into sewer, water system or soil. |
|---------------------------------|---|

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

|   |  |
|---|--|
| Specify the appropriate methods of disposal | Residues of explosives must immediately be removed for intermediate storage and disposed for safely destruction. Product and package is hazardous waste. Deliver to authorised waste vendor. |
|   | Contact local authorities regarding waste treatment of explosives.   |
| Product classified as hazardous waste       | Yes  |

## SECTION 14: Transport information

### 14.1. UN number

|           |      |
|-----------|------|
| ADR       | 0072 |
| RID       | 0072 |
| IMDG      | 0072 |
| ICAO/IATA | 0072 |

### 14.2. UN proper shipping name

|           |             |
|-----------|-------------|
| ADR       | RDX, WETTED |
| RID       | RDX, WETTED |
| IMDG      | RDX, WETTED |
| ICAO/IATA | RDX, WETTED |

### 14.3. Transport hazard class(es)

|           |      |
|-----------|------|
| ADR       | 1.1D |
| RID       | 1.1D |
| IMDG      | 1.1D |
| ICAO/IATA | 1.1D |

### 14.4. Packing group

|         |               |
|---------|---------------|
| Comment | Not relevant. |
|---------|---------------|

### 14.5. Environmental hazards

### 14.6. Special precautions for user

|                                  |  |
|----------------------------------|--|
| ADR additional information       | Packing instructions: P112, PP45, MP20 |
| RID Other applicable information | Packing instructions: P112, PP45, MP20 |
| EmS                              | F-B, S-Y                               |
| ICAO/IATA Additional information | PROHIBITED                             |

### 14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

|                    |               |
|--------------------|---------------|
| Pollution category | Not relevant. |
|--------------------|---------------|

## SECTION 15: Regulatory information

|        |           |
|--------|-----------|
| EC no. | 204-500-1 |
|--------|-----------|

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

|                               |   |
|-------------------------------|---|
| References (laws/regulations) | CHIP Regulations. The Chemicals (Hazard Information and Packaging for |
|-------------------------------|---|



Supply) Regulation.  
 Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP-regulation) with later amendments.  
 Regulation (EC) No 1907/2006 (REACH) Annex II: Safety data sheets, with later amendments.  
 EH40/2005 Workplace exposure limits, with later amendments.  
 The Hazardous Waste (England and Wales) Regulations 2005 with amendments.  
 National regulation regarding handling of explosives. (Directive 93/15 EEC)  
 Dangerous Goods regulations

## 15.2. Chemical safety assessment

Chemical safety assessment performed Yes

## SECTION 16: Other information

|  |   |
|--|---|
| Supplier's notes   | The information contained in this SDS must be made available to all those who handle the product.   |
| Classification according to Regulation (EC) No 1272/2008 [CLP/GHS] | Expl. 1.1; H201;<br>Acute tox. 3; H301;<br>STOT SE1; H370;<br>STOT RE2; H373;   |
| List of relevant R-phrases (under headings 2 and 3).               | R2 Risk of explosion by shock, friction, fire or other sources of ignition.<br>R48/22 Harmful: danger of serious damage to health by prolonged exposure if swallowed.<br>R39/25 Toxic: danger of very serious irreversible effects if swallowed.<br>R25 Toxic if swallowed.   |
| List of relevant H-phrases (Section 2 and 3).                      | H301 Toxic if swallowed.<br>H370 Causes damage to organs<br>H201 Explosive; mass explosion hazard.<br>H373 May cause damage to organs through prolonged or repeated exposure  |
| Recommended restrictions on use                                    | The product can only be handed out to personnel that have valid permits issued by the police.   |
| Abbreviations and acronyms used                                    | PBT: Persistent, Bioaccumulative and Toxic<br>vPvB: very Persistent and very Bioaccumulative<br>LD50: Lethal dose, is the amount of a substance given to a group of test animals, which causes the death of 50%.<br>LC50: Concentration in water having 50% chance of causing death to aquatic life<br>EC50: The effective concentration of substance that causes 50% of the maximum response<br>NOEC: No observed effect concentration   |
| Additional information   | Overview of identified uses of the substance:<br>Manufacture of RDX: PROC 2, 4, 8b. ERC 1.<br>Formulation of RDX: PROC 3, 9, 8a. PC11. ERC 2.<br>Use as a substance/mixture for ammunition: SU 0,C25.4.0. PROC 9, 14, 24, 5, 8b. PC 11. ERC 5.<br>Production of propellant, composite explosives or other energetic components containing Hexogen: SU 0. PROC 9, 14, 8b. PC 11. ERC 5.<br>Laboratory activities – Research and Development: SU 24. PROC 14, 15. PC 11. ERC 5.<br>Use of ammunition: SU 22. PROC 21. PC 11. ERC 9b.<br>Use of explosive items or pyrotechnic articles: SU 0, 22, 2a, 2b, 19. PROC 21. PC 11. ERC 9b. |
| Important data sources used to construct the safety data sheet     | Information in CSR Report.<br>Dossier from Chemring Nobel AS (CLP).   |



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|  |   |
|--|---|
| Information which has been added, deleted or revised | Version: 3. Amendment, section: 1, 2, 9, 11, 14, 15. Only linguistic corrections.   |
| Checking quality of information                      | This SDS is quality controlled by National Institute of Technology in Norway, certified according to the Quality Management System requirements specified in ISO 9001:2008. |
| Responsible for safety data sheet                    | Chemring Nobel AS   |
| Prepared by  | National Institute of Technology as, Norway v/ Knut Finsveen  |