4. CHEMICAL AND PHYSICAL INFORMATION

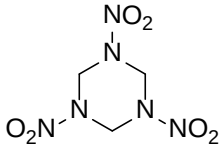
4.1 CHEMICAL IDENTITY

RDX is a nitramine produced mainly for use in explosives (HSDB 2009). Information regarding the chemical identity of RDX is located in Table 4-1.

4.2 PHYSICAL AND CHEMICAL PROPERTIES

RDX is a white crystalline solid. Information regarding the physical and chemical properties of RDX is located in Table 4-2. Pure RDX is a highly explosive compound that can be initiated by impact, temperature, and friction (Akhavan 2004; Boileau et al. 2009; HSDB 2009). RDX is toxic by inhalation and dermal routes (Lewis 2007). Acrid fumes of nitrogen oxides may be released when heated to decomposition (HSDB 2009; Lewis 2000).

Table 4-1. Chemical Identity of RDX

Characteristic	Information	Reference
Chemical name	RDX	HSDB 2009
Synonym(s)	Cyclonite; hexogen; cyclotrimethylenetrinitramine; hexogen 5W;T4; hexahydro-1,3,5-trinitro-1,3,5-triazine; 1,3,5-triaza-1,3,5,-trinitrocyclohexane; 1,3,5-trinitrohexahydro-1,3,5-triazine; cyclotrimethylenenitramine; hexolite; S-triazine, hexahydro-1,3,5-trinitro-; 1,3,5-triazine, hexahydro-1,3,5-trinitro-; 1,3,5-triazine, perhydro, 1,3,5-trinitro-; trimethylenetrinitramine; sym-trimethylene trinitramine; 1,3,5-trinitrohexahydro-S-triazine; 1,3,5-trinitroperhydro-1,3,5-triazine; 1,3,5-trinitro-1,3,5-triazacyclohexane; trinitrotrimethylenetriamine	HSDB 2009
Registered trade name(s)	No data	
Chemical formula	$C_3H_6N_6O_6$	HSDB 2009
Chemical structure		O'Neil et al. 2006
Identification numbers:		
CAS registry	121-82-4	HSDB 2009
RTECS	XY9450000	RTECS 2009
EPA hazardous waste	No data	
OHM/TADS	No data	
DOT/UN/NA/IMDG shipping	UN0072; UN0391; UN0483; IMO1.1; DOT Explosive 1.1D	HSDB 2009; Lewis 2000
HSDB	2079	HSDB 2009
NCI	No data	

CAS = Chemical Abstracts Service; DOT/UN/NA/IMDG = Department of Transportation/United Nations/North America/International Maritime Dangerous Goods Code; EPA = Environmental Protection Agency; HSDB = Hazardous Substances Data Bank; NCI = National Cancer Institute; OHM/TADS = Oil and Hazardous Materials/Technical Assistance Data System; RTECS = Registry of Toxic Effects of Chemical Substances

Table 4-2. Physical and Chemical Properties of RDX

Property	Information	Reference
Molecular weight	222.26	Merck 1989
Color	White	Akhavan 2004
Physical state	Crystalline solid	Akhavan 2004
Melting point	204–206 °C	Boileau et al. 2009; Merck 1989
Boiling point	Decomposes	U.S. Army 1991
	Decomposition temperature: 213 °C	Akhavan 2004
Density at 20 °C	1.82 g/mL	Merck 1989
Odor	No data	
Odor threshold:		
Water	No data	
Air	No data	
Solubility:		
Water at 20 °C	38.4–38.9 mg/L; 60 mg/L	U.S. Army 1983b, 1991
Organic solvents	Slightly soluble in methanol, ether, ethyl acetate, glacial acetic acid	Merck 1989
Partition coefficients:		
Log K_{ow}	0.87	HSDB 2009; PHYSPROP 2009
Log K_{oc}	1.80[a]	U.S. Army 1987a
Vapor pressure		
At 20 °C	$1x10^{-9}$ mm Hg (Torr)	U.S. Army 1987a
At unidentified temperature	0.05 Pa ($3.8x10^{-4}$ mm Hg)	Boileau et al. 2009
Henry's law constant at 25 °C	$2.0x10^{-11}$ atm-m^3/mol[b]	PHYSPROP 2009
Autoignition temperature	No data	
Flashpoint	No data	
Flammability limits	No data	
Explosive limits	Explosion may be prompted by sudden shock, high temperature, or combination of both	HSDB 2009

[a]Calculated value
[b]Estimated value