

### **3. CHEMICAL AND PHYSICAL INFORMATION**

#### **3.1 CHEMICAL IDENTITY**

Information regarding the chemical identity of ethion is located in Table 3-1.

#### **3.2 PHYSICAL AND CHEMICAL PROPERTIES**

Information regarding the physical and chemical properties of ethion is located in Table 3-2.

## 3. CHEMICAL AND PHYSICAL INFORMATION

**Table 3-1. Chemical Identity of Ethion**

Characteristic	Information	Reference
Chemical name	Ethion	HSDB 1998
Synonym(s)	Phosphorodithioic acid; S,S'-methylene O,O,O',O'-tetraethyl ester; ethyl methylene phosphorodithioate; O,O,O',O'-tetraethyl S,S'-methylenediphosphorodithioate; bis[-(diethoxyphosphinothioyl)mercapto]methane	Merck 1989
Registered trade name(s)	NIA1240, Ethanox, Nialate, RP8167, Rodocide, and others	HSDB 1998
Chemical formula	$C_9H_{22}O_4P_2S_4$	Merck 1989
Chemical structure	$  \begin{array}{c}  \text{S} \qquad \qquad \qquad \text{S} \\     \qquad \qquad \qquad    \\  (C_2H_5O)_2P - S - CH_2 - S - P(OHC_2H_5)_2  \end{array}  $	
Identification numbers:		
CAS Registry	563-12-2	HSDB 1998
NIOSH RTECS	TE455000	HSDB 1998
EPA Hazardous Waste	7800010	HSDB 1998
OHM/TADS/DOT/UN/NA/IMCO	IMO 6.1; UN 3018; NA 2783	HSDB 1998
HSDB	399	HSDB 1998
NCI	No data	

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

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**Table 3-2. Physical and Chemical Properties of Ethion**

Property	Information	Reference
Molecular weight	384.48	Merck 1989
Color	White/colorless to amber	Tomlin 1994
Physical state	Liquid	Tomlin 1994
Melting point	-12 to -13	Merck 1989
Boiling point	164–165 at 0.3 mm Hg	EPA 1989b
Density at 19 EC	1.220 at 20 EC	Merck 1989
Odor	Odorless in pure form; technical product has a disagreeable odor	HSDB 1998
Odor threshold:		
Water	No data	
Air	No data	
Solubility:		
Fresh water at 25 EC	0.6 mg/L	Sharom et al. 1980a
Salt water at 25 EC	No data	
Organic solvent(s)	Xylene, chloroform, acetone, kerosene plus 1% methyl ethyl ketone, benzene	Merck 1989
	Most organic solvents	HSDB 1998
Partition coefficients:		
Log $K_{ow}$	5.073	Bowman and Sans 1983
Log $K_{oc}$	4.189 (average in four soils)	HSDB 1998
	3.810 (organic soil)	Sharom et al. 1980b
	3.936 (beverly sandy loam)	
	4.004 (plainsfield sand)	
Vapor pressure at 20 EC	$1.5 \times 10^{-6}$ mm Hg	EPA 1989b; Merck 1989
Henry's law constant: at 25 EC	$6.9 \times 10^{-7}$ atm m <sup>3</sup> /mole	HSDB 1998

## 3. CHEMICAL AND PHYSICAL INFORMATION

**Table 3-2. Physical and Chemical Properties of Ethion (continued)**

Property	Information	Reference
Hydrolysis half-life 30 EC (sterile water)	pH 4 & 7 146 days pH 8 62 days pH 10 1 day	Dierberg and Pfeuffer 1983
30 EC (non-sterile drainage water)	26 days	
25 EC (Water with 1% ethanol)	pH 4.5 99 weeks pH 5 63 weeks pH 6 58 weeks pH 7 25 weeks pH 8 8.4 weeks	Chapman and Cole 1982
Autoignition temperature	No data	
Flashpoint	No data	
Flammability limits at 25 EC	May burn but does not ignite readily	HSDB 1998
Reactivity	Hydrolyzed by acids and alkalies	Tomlin 1994
	Emits toxic oxides of sulfur and phosphorous (T\$150 EC)	Sax 1984
	Slowly oxidized in air	Tomlin 1994
Conversion factors (25 EC)	1 ppm = 15.7 mg/m <sup>3</sup> 1 mg/m <sup>3</sup> = 0.064 ppm	Calculated
Explosive limits	Tends to decompose with violence above 150 EC	HSDB 1998