4. CHEMICAL AND PHYSICAL INFORMATION

4.1 CHEMICAL IDENTITY

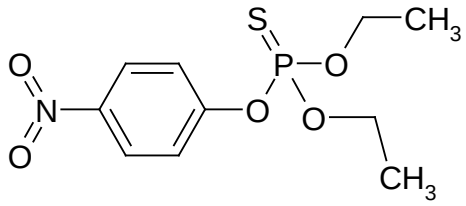
Information regarding the chemical identity of parathion is located in Table 4-1.

In the United States, parathion was sold in the form of emulsion concentrates, wettable powders, granules, dusts, aerosols, and oil sprays (Farm Chemicals Handbook 1987). In 1991, parathion became a restricted use pesticide and was formulated as Parathion EC and Ethyl Methyl Parathion 6-3, which were liquid, emulsifiable concentrates and applied using aerial equipment. Manufacture of parathion for manufacturing use products was discontinued as of September 2000, and manufacture of all end use products were discontinued effective December 31, 2002 (EPA 2000). Internationally, parathion may be formulated as an aerosol, capsule suspension, dustable powder, emulsifiable concentrate, granule, and wettable powder. Formulations range from a 1% dust to an 83.5% concentrate. The technical-grade material is 98% pure (FAO 1997).

4.2 PHYSICAL AND CHEMICAL PROPERTIES

Information regarding the physical and chemical properties of parathion is located in Table 4-2.

Table 4-1. Chemical Identity of Parathion

Characteristic	Information	Reference
Chemical name	O,O-Diethyl O-(4-nitrophenyl) phosphorothioate	HSDB 2013
Synonyms(s)	O,O-Diethyl-O-4-nitrophenyl phosphorothioate; O,O-diethyl O-p-nitrophenyl thiophosphate; parathion, ethyl parathion; others	HSDB 2013
Registered trade name(s)	Alkron, Aileron, Aphamite, Bladen, Corothion, Etilon, Folidol, E-605, Fostox E, Geofos, Kriss, Niram, Orthophos, Panthion, Paramar, Paraphos, Parathene, Parawet, Penncap-E, Phoskil, Rhodiatox, SNP, Soprathion, Stathion, Thiophos, Vitrex, others	FAO 1997
	PESTANAL®	Sigma Aldrich 2014
Chemical formula	$C_{10}H_{14}NO_5PS$	HSDB 2013
Chemical structure		PhysProp 2013
Identification numbers:		
CAS registry	56-38-2	HSDB 2013
NIOSH RTECS	TF 4550000	NIOSH 2009
EPA hazardous waste	P089	HSDB 2013
OHM/TADS	No data	
DOT/UN/NA/IMCO shipping	UN 2783 Organophosphorus pesticides; IM06.1 Organophosphorus pesticides; solid	HSDB 2013
HSDB	197	HSDB 2013
NCI	C00226	NCI 1979

CAS = Chemical Abstracts Services; DOT/UN/NA/IMCO = Department of Transportation/United Nations/North America/Intergovernmental Maritime Dangerous Goods Code; EPA = Environmental Protection Agency; HSDB = Hazardous Substances 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

Table 4-2. Physical and Chemical Properties of Parathion

Property	Information	Reference
Molecular weight	291.26	HSDB 2013
Color	Pale yellow (pure); dark brown (technical grade liquid generally in an organic solvent); colorless to white (formulated solid)	FAO 1997; IPCS 2005
Physical state	Liquid (pure); solid (formulated)	HSDB 2013; IPCS 2005
Melting point	6.1°C	Tomlin 2010
Boiling point	375°C at 760 mm Hg	O'Neil et al. 2013
Density:		
at 25°C/4°C	1.26	HSDB 2013
Odor	Garlic-like Phenol-like	HSDB 2013
Odor threshold:		HSDB 2013
Water	4.00×10^{-2} mg/L	
Air	0.470 mg/m^3	
Taste threshold	No data	
Solubility:		
Water at 20°C	11 mg/L	Tomlin 2010
Organic solvent(s)	Miscible in alcohols, esters, ethers, ketones, aromatic hydrocarbons, and animal and vegetable oils; practically insoluble in petroleum ether, kerosene, and usual spray oils	HSDB 2013
Partition coefficients:		
Log K_{ow}	3.83	Tomlin 2010
Log K_{oc}	Eight soil types, 2.48–2.69; four soil types, 2.98–3.23; average for four soils, 4.019	Gerstl and Mingelgrin 1984; Sharom et al. 1980
Vapor pressure		
at 20°C	6.68×10^{-6} mm Hg	HSDB 2013
Henry's law constant	2.98×10^{-7} atm-m^3/mol	PhysProp 2013
Autoignition temperature	No data	HSDB 2013
Flashpoint	120–160°C until flammable impurities removed	HSDB 2013
Flammability limits	Not highly flammable	HSDB 2013
Explosive limits	Decomposes upon heating and residues can explode	HSDB 2013

FAO = Food and Agriculture Organization; HSDB = Hazardous Substances Data Bank; NIOSH = National Institute for Occupational Safety and Health