

Section 2

CHEMISTRY ASSESSMENT

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1. OVERVIEW

Parathion-methyl is an organophosphorus insecticide and acaricide. It is used for the control of chewing and sucking insects in a very wide range of crops, including cereals, fruit (including citrus), vines, vegetables, cotton and field crops. Parathion-methyl is an acutely toxic insecticide that affects the nervous system by inhibiting the activity of an enzyme called cholinesterase (ChE).

Parathion-methyl is included in Schedule 7 of the SUSDP.

Parathion-methyl TGAC manufactured by Bayer India Ltd is currently approved in Australia (approval numbers: 44197).

Parathion-methyl manufacturing concentrate manufactured by Cheminova Agro A/S of Denmark is also currently approved in Australia (approval numbers: 44175).

The chemistry aspects (synthetic process, quality control procedures, batch analysis results and analytical methods) were evaluated previously and found acceptable.

2. ACTIVE CONSTITUENT

2.1 Chemical identity

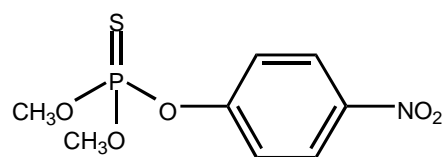
Common Name: Parathion-methyl (ISO, Standards Australia, BSI)

Other Names: Methyl-Parathion

IUPAC Name: O,O-dimethyl O-4-nitrophenyl phosphorothioate

CAS Registry number: 298-00-0

Structural Formula:



Empirical formula: C₈H₁₀NO₅PS

Molecular weight: 263.2

Purity: 95% minimum parathion-methyl.

The impurity for O,O,O,O-tetramethyl thiodiphosphate (methyl analogue of sulfotep) is 1.5% maximum. It is considered that other compounds of toxicological significance (N-nitrosamines, halogenated dibenzo-pi-dioxins or halogenated dibenzofurans and PCBs) are not expected in parathion-methyl TGAC due to the raw materials and synthetic chemistry route used.

2.2 Physical and chemical properties

Pure active constituent

Colour	White
Odour	Garlic-like
Physical state	Crystalline solid
Melting point	35-36 ⁰ C
Boiling point	109 ⁰ C at 0.05 mm Hg
Refractive index	1.55 if liquid at 35 ⁰ C
Specific gravity	1.35 g/mL at 20 ⁰ C
Octanol/ water partition coefficient	Log P = 3.0
Vapor pressure	0.97 x 10 ⁻⁵ mm Hg at 20 ⁰ C 3.8 x 10 ⁻⁵ mm Hg at 30 ⁰ C 11.3 x 10 ⁻⁵ mm Hg at 40 ⁰ C
Solubility in water	55-60 mg/L at 25 ⁰ C
Solubility in organic solvents	n-hexane 10-20 g/L dichloromethane >1000 g/L toluene >1000 g/L 2-propanol 100-200 g/L
Hydrolysis	Hydrolysed very slowly in acidic media, more rapidly in alkaline media At 22 ⁰ C pH 4 T1/2 = 111 days pH 7 T1/2 = 100 days pH 9 T1/2 = 95 days At 25 ⁰ C pH 5 T1/2 = 68 days pH 7 T1/2 = 40 days pH 9 T1/2 = 33 days
Thermal decomposition	Isomerizes readily to OS-dimethyl isomer on heating
Sunlight	Darkens on exposure to sunlight

Technical grade active constituent

Colour	Yellowish-brown
Odour	phenyl-like
Physical state	liquid
Melting point	29 ⁰ C

Vapor pressure	$(0.965 \pm 0.055) \times 10^{-5}$ mm Hg at 25 ⁰ C
Specific gravity	1.26 ± 0.01
Solubility	Very slightly soluble in water, 55 mg/L at 25 ⁰ C. Miscible with most organic solvents, slightly soluble in petroleum oils
Viscosity	15.30 centipoise at 25 ⁰ C
Flash point	100 ⁰ C

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