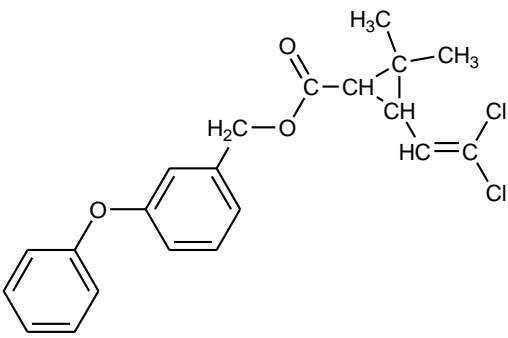


6	CAS No.: 52645-53-1	Substance: Permethrin
<p>Chemical Substances Control Law Reference No.: 3-4010 PRTR Law Cabinet Order No.*: 1-350 Molecular Formula: C₂₁H₂₀Cl₂O₃ Molecular Weight: 391.29</p> <p style="text-align: center;">Structural formula:</p>  <p>The structure shows a biphenyl group (two benzene rings connected by an oxygen atom) attached to a methylene group (-CH₂-). This methylene group is part of a cyclopropane ring system. The cyclopropane ring has a methyl group (-CH₃) and a chlorine atom (-Cl) attached to one of its carbons, and a methyl group (-CH₃) and a chlorine atom (-Cl) attached to another carbon. The third carbon of the cyclopropane ring is bonded to a carbonyl group (-C(=O)-) which is further attached to a methylene group (-CH₂-).</p> <p>*Note: No. in Revised Cabinet Order enacted on October 1, 2009</p>		
<p>1. General information</p> <p>The aqueous solubility of this substance is 0.2 mg/1000 g (20°C), the partition coefficient (1-octanol/water) (log K_{ow}) is 6.50, and the vapor pressure is 9.75×10⁻⁹ mmHg (=1.3×10⁻⁶ Pa) (20°C). The half-life in soil due to biodegradability (aerobic degradation) is 4–19 days. The substance is stable towards hydrolysis at pH values of 5 and 7, but at a pH of 9 (25°C) it exhibits a half-life of 50 days.</p> <p>This substance is a registered agricultural chemical under the Agricultural Chemicals Regulation Law. This substance is designated as a Type III Monitoring Chemical Substance under the Law Concerning the Examination and Regulation of Manufacture, etc. of Chemical Substances. This substance is classified as a Class 1 Designated Chemical Substance under the Law concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management (PRTR Law). It is primarily used as an active ingredient for pyrethroid-based insecticides in various forms such as aerosols, fumigation agents, wettable powders, emulsions, and granules. The production and import quantity in 2008 was 553 t.</p> <hr/> <p>2. Exposure assessment</p> <p>Total release to the environment in fiscal 2007 under the PRTR Law was 33 t, of which more than 99% was unreported. Distribution in the environment by medium predicted by using a multi-media model indicated that 68.7% of releases were distributed to soil in areas where releases to the environment and soil were greatest, 40.2% of releases were distributed to soil in areas where releases to public water bodies were greatest, and 54.3% of releases were distributed to soil in areas where releases to the atmosphere were greatest.</p> <p>The predicted environmental concentration (PEC), which indicates exposure to aquatic organisms, was less than 0.05 µg/L for public freshwater bodies and less than around 0.05 µg/L for seawater. Furthermore, in consideration of the Standard to withhold Registration related to preventing damage to aquatic plants and animals, a predicted environmental concentration (<i>tier 1</i> short-term PEC) of 0.022 µg/L has been derived.</p> <hr/> <p>3. Initial assessment of ecological risk</p> <p>With regard to acute toxicity, the following reliable data were obtained: a 96-h median effective concentration (EC₅₀) of 68 µg/L for growth inhibition in the diatom <i>Skeletonema costatum</i>; a 96-h median lethal concentration (LC₅₀) of 0.02 µg/L for the Mysidae crustacean <i>Americamysis bahia</i>; and a 96-h LC₅₀ of 0.69 µg/L for the fish species <i>Oncorhynchus mykiss</i> (rainbow trout). A 48-h LC₅₀ of 0.28 µg/L was also obtained for the yellow fever mosquito <i>Aedes aegypti</i>.</p>		

Accordingly, based on these acute toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) 0.0002 µg/L was obtained.

With regard to chronic toxicity, the following reliable data were obtained: a 72-h no observed effect concentration (NOEC) of 14 µg/L for growth inhibition in the green algae *Pseudokirchneriella subcapitata*; and a 32-d NOEC of 0.66 µg/L for the fish species *Pimephales promelas* (fathead minnow). Also obtained was a 21-d maximum acceptable toxicant concentration (MATC) of 10 µg/L for mortality in the freshwater mussel *Lampsilis siliquoidea*. Accordingly, based on these chronic toxicity values and an assessment factor of 100, a predicted no effect concentration (PNEC) of 0.0066 µg/L was obtained. The value of 0.0002 µg/L obtained from the acute toxicity to the crustacean was used as the PNEC for this substance.

The PEC/PNEC ratio was less than 250 for both freshwater bodies and seawater, and a judgment cannot be made at present. To augment environmental concentration data, use trends, production and import quantities, and releases to the environment for this substance should be considered where necessary.

Hazard assessment (basis for PNEC)			Assessment factor	Predicted no effect concentration PNEC (µg/L)	Exposure assessment		PEC/PNEC ratio	Assessment result
Species	Acute/chronic	Endpoint			Water body	Predicted environmental concentration PEC (µg/L)		
Crustacean Mysidae	Acute	LC ₅₀	100	0.0002	Freshwater	< 0.05	< 250	× (▲)
		Mortality			Seawater	< 0.05		

4. Conclusions

	Conclusions	Judgment
Ecological risk	Judgment could not be made at present regarding risk. To augment environmental concentration data, use trends, production and import quantities, and releases to the environment for this substance should be considered where necessary.	(▲)

[Risk judgments] ○: No need for further work ▲: Requiring information collection
 ■: Candidates for further work ×: Impossibility of risk characterization
 (○) : Though a risk characterization cannot be determined, there would be little necessity of collecting information.
 (▲) : Further information collection would be required for risk characterization.