

Pirimiphos-methyl

Pirimiphos-methyl is an organophosphorus compound that is used in a wide range of pesticidal applications. Pirimiphos-methyl is being considered by WHO for addition to potable water in containers as a mosquito larvicide treatment, particularly to control dengue fever. The manufacturer recommends the direct addition of 1 mg/litre to water.

The only biochemical effect consistently observed with pirimiphos-methyl in acute, short-term or long-term studies is cholinesterase inhibition. Studies with mice, rats and dogs showed NOAELs of 0.5 mg/kg of body weight per day and above. Young animals do not appear to be significantly more sensitive than adults. In human studies, no cholinesterase inhibition was seen at 0.25 mg/kg of body weight per day (the highest dose tested). On this basis, JMPR revised the ADI to 0–0.03 mg/kg of body weight by applying a 10-fold safety factor to the NOAEL in the human studies.

At the maximum recommended dosage for drinking-water of 1 mg/litre, a 60-kg adult drinking 2 litres of water would have an intake of 0.033 mg/kg of body weight, compared with the ADI of 0–0.03 mg/kg of body weight. The intake for a 10-kg child drinking 1 litre of water would be 0.1 mg/kg of body weight; for a 5-kg bottle-fed infant drinking 0.75 litre, it would be 0.15 mg/kg of body weight. There is uncertainty regarding the level that would cause effects in humans, since the NOAEL on which the ADI is based was the highest dose tested, and so the ADI may be more conservative than is at first apparent. These intake figures are all below the ARfD of 0.2 mg/kg of body weight and would not result in an acute exposure risk from the initial application of pirimiphos-methyl to drinking-water containers at the recommended dose. In addition, the low solubility and the high log K_{ow} of pirimiphos-methyl indicate that it is very unlikely to remain in solution at the maximum recommended applied dose, so the actual levels of exposure are expected to be lower than those calculated. Exposure from food is generally considered to be low, but occasional high exposures can be experienced.

Based on the above calculations, pirimiphos-methyl is not recommended for direct application to drinking-water unless no other effective and safe treatments are available. If pirimiphos-methyl is applied directly to drinking-water, consideration should be given to using alternative sources of water for bottle-fed infants and small children for a period after its application, where this is practical. However, it is noted that exceeding the ADI will not necessarily result in adverse effects.

History of guideline development

Pirimiphos-methyl was not considered in the WHO *International Standards for Drinking-water* or in the first or second editions of the WHO *Guidelines for Drinking-water Quality*.

Assessment date

The risk assessment was conducted in 2007.

Principal references

FAO/WHO (1993) Pirimiphos-methyl. In: *Pesticide residues in food – 1992 evaluations. Part II – Toxicological*. Geneva, World Health Organization, Joint FAO/WHO Meeting on Pesticide Residues (WHO/PCS/93.34;
<http://www.inchem.org/documents/jmpr/jmpmono/v92pr16.htm>)

FAO/WHO (2006) Pirimiphos-methyl. In: *Pesticide residues in food 2006*. Rome, Food and Agriculture Organization of the United, Joint FAO/WHO Meeting on Pesticide Residues, pp. 178–179 (FAO Plant Production and Protection Paper 187; http://www.fao.org/ag/AGP/AGPP/Pesticid/JMPR/DOWNLOAD/2006_rep/report2006jmpr.pdf).

WHO (2008) *Pirimiphos-methyl in drinking-water: Use for vector control in drinking-water sources and containers. Background document for preparation of WHO Guidelines for drinking-water quality*. Geneva, World Health Organization (WHO/HSE/AMR/08.03/15).