



# ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

## Propoxur

Propoxur, known by the trade name Baygon™, is a component of a considerable number of registered products. Many household roach and ant sprays, flea and tick control agents for pets, and sprays and/or foggers for control of adult mosquitoes contain propoxur. Its widespread indoor usage is reflected in the results of EPA's Non-Occupational Pesticide Exposure Study released in January 1990. Residential indoor air monitoring for 32 pesticides found propoxur to be one of the five most commonly detected analytes.

A carbamate insecticide, its mechanism of acute toxicity involves temporary (reversible) cholinesterase inhibition. Technical propoxur is extremely toxic with reported oral LD50 values of 69 and 47 mg/kg for male and female rats, respectively. Malaise, muscle weakness, dizziness, and sweating are commonly reported early symptoms of poisoning. Headache, nausea, and diarrhea are often prominent. The potential for acute irritant effects to the skin and eyes is low.

Reports of human incidents associated with propoxur use can be found in newspaper accounts, medical journals, and regulatory files.

EPA's now defunct Pesticide Incident Monitoring System, which tracked pesticide-related illnesses from 1966 to 1979, cites 453 incidents involving propoxur. Most (391) occurred in the home. In 1984, an Illinois newspaper reported 24 students overcome with illness from propoxur fumes which resulted from application in a school. In 1982, physicians associated with

gen, as although tumors occurred in only one species, there was an unusually high incidence (67-75%) in both sexes at the highest dose (vs. 0% in controls). In an acceptable rat chronic effects/cancer study, weight depression, bladder hyperplasia and a slight increase in sciatic neuropathy were observed in rats at 1000 ppm. These were more pronounced

at the 5000 ppm dose level, and were associated with an increased incidence of muscular atrophy, and a highly significant incidence of bladder tumors for both sexes. Bladder tumors are relatively rare, and the onset of hyperplasia and papillomas of the bladder was early. In addition, females had consistently more plasma acetylcholinesterase inhibition compared to

controls, and at 5000 ppm had a statistically borderline increase in uterine cancer. An acceptable 2 year mouse study found no evidence of tumor formation at dietary dosage levels up to 6000 ppm.

Propoxur's chronic toxicity data base in support of EPA registration is not complete. The two submitted teratology studies were found to be unacceptable, and new studies are required. While no malformations were seen, dose-dependent reduced fetal weights were observed in one

### *chemicalWATCH* Stats:

**Chemical Class:** Carbamate insecticide

**Use:** Control of ants, roaches and hornets indoors (residential, institutional, industrial, and commercial buildings) and for very limited outdoor applications

**Toxicity rating:** Highly toxic

**Signal Word:** Caution, Warning, or Danger

**Health Effects:** Probable human carcinogen (Group B2), Cholinesterase inhibitor

**Environmental Effects:** Highly toxic to fish, and other aquatic organisms. Highly toxic to bees and moderately to very highly toxic to birds. Moderately toxic to mammals.

an Air Force pediatric clinic reported 15 cases of severe blood disorders including aplastic anemia and acute lymphoblastic leukemia, which developed following inhalation exposure to household insecticides. Eleven of the child subjects were exposed to sprays containing both DDVP, an organophosphate, and propoxur.

EPA-required animal data corroborate human reports of adverse health effects. Propoxur is classified as a B2, or probable human, onco-

study. An additional reproduction study is also required as the existing 3-generation rat study is considered of "restricted value." Available and acceptable mutagenicity studies give no indication of mutagenic activity, however, several data gaps exist which should be filled to more adequately define the mutagenic potential of propoxur. EPA is also requiring an acute neurotoxicity study in the rat, based on the observation of neuropathy in the chronic rat study. Normally, only organophosphates are expected to cause the classical form of acute delayed neurotoxicity, and require testing in hens for this potential.

Other information deemed vital to assessing the potential hazard associated with propoxur's use include a 90 day subchronic dermal toxicity study, an acute or 90-day subacute inhalation study, and a dermal absorption study. Such data will more accurately reflect the common exposure scenario. Domestic animal safety testing is also required since dog and cat formulations may con-

tain other actives or inerts affecting dosage rates or otherwise modifying toxicity.

Propoxur breaks down relatively quickly in mammalian systems as well as the environment. Metabolism studies indicate a number of urinary metabolites (such as O-isopropoxyphenyl and 2-hydroxyphenyl methylcarbamate) are rapidly excreted after exposure to propoxur. In a rat metabolism study, 85% of radioactively labeled propoxur was eliminated in 16 hours, 25-35% as the volatile compounds CO<sub>2</sub> and acetone, and 50% in urine as conjugates. Information regarding possible accumulation and/or bioretention of propoxur or its metabolites is presently insufficient and a metabolism study is required.

In the environment, propoxur is subject to degradation via hydrolysis and microbial action. It is also very volatile, technical propoxur has a vapor pressure of 0.01 mmHg and a half-life of 13 days at 25°C. Hydrolysis is both pH and temperature dependent. Under acidic conditions

propoxur is relatively stable. At neutral pH (7) half-life is 30 days at 30°C, and drops to 23 hours at 50°C. At alkaline pH, it is quite unstable, showing half-life of 1.2 hours at 30°C and 0.1 hours at 50°C. Thus, although propoxur is subject to rapid leaching and may be expected to move laterally through runoff, except under acid conditions, residues would be subject to hydrolysis. In soil, the half life is 14-33 days under field conditions, 10% remains after 45 to 115 days. Degradation products in soil and water are O-isopropoxyphenol, CO<sub>2</sub>, and methyl amine, all of which volatilize into the atmosphere or enter the metabolic pools of plants and microflora.

A non-specific poison, propoxur is highly toxic to non-target, beneficial species such as bees and is of very high toxicity to crustaceans, fish, aquatic insects, and aquatic worms.

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### **Update, November 2007:**

EPA issued a Reregistration Eligibility Decision (RED) in 1997, which authorized all eligible uses of propoxur. It is highly toxic (Toxicity Category II) for oral exposure and moderately toxic (Toxicity Category III) via the dermal and inhalation routes of exposure. Propoxur is classified as a probable human carcinogen (Group B2) by EPA, and California lists it as a known human carcinogen.

In light of potential carcinogenic risks to pest control operators and the general public, EPA considered initiating a Special Review for propoxur in 1988. However, after evaluating the exposure and carcinogenicity data in 1995, the Agency decided not to perform the review. They made the determination based on the fact that the uses that posed the greatest concern (flea dips and shampoos for pets, and total-release fogger products) had been eliminated through voluntary cancellation or label amendment. Also, in 1989, the manufacturer of technical propoxur, Bayer, decided not to support the outdoor uses of propoxur on ornamentals, on lawns/turf, and for mosquito control. The end-use manufacturers followed suit, and these uses were removed from the label. The remaining outdoor uses of propoxur include residential uses around home foundations, sidewalks, patios, and driveways, spot treatments to wasp nests and ant hills, insecticidal tape on boat mooring lines and in gypsy moth and med fly traps.

A number of studies required for reregistration indicate that propoxur has little, if any, mutagenicity. An acute neurotoxicity study in rats showed treatment-related effects in motor and locomotor activity measurements. A 90-day subchronic dermal study on rabbits revealed no dermal irritation nor treatment-related effects in a number of parameters at doses up to 1000 mg/kg/day. In a 13-week subchronic neurotoxicity study on rats, reduced pupillary reflex was seen in the final week at the highest dose (8000 ppm) tested, presumably due to cholinesterase inhibition. Propoxur is a cholinesterase inhibitor, as measured by reduced cholinesterase activity in the brains and blood of rats. In a human dermal absorption study, the percent absorption was determined to be 19.6 percent, which is expected to more closely approximate the rate of absorption to be expected in the field than the value of 50% dermal absorption previously determined in the rat dermal absorption study.

Toxicity was seen at doses as low as 80 ppm, as measured by reduced cholinesterase in red blood cells, the brain and plasma. In a developmental toxicity study in rats, maternal toxicity was observed at mid dose, and no embryotoxic, fetotoxic, or teratogenic effects were seen up to the highest dose. In rabbits, maternal toxicity was present only at the highest dose tested (30 mg/kg/day), and embryo/fetotoxicity was evidenced by slight post-implantation loss and a decreased number of mean pups per dam.

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