

# CARBARYL

## general fact sheet

### What is carbaryl?

Carbaryl is a man-made pesticide that is toxic to insects. It is commonly used to control aphids, fire ants, fleas, ticks, spiders, and many other outdoor pests. It is also used in some orchards to thin out blossoms on fruit trees.

Carbaryl has been registered for use in pesticide products since 1959. No carbaryl products are currently registered for use inside homes or on pets.



photo credit: Brigitte Werner, pixabay

### What are some products that contain carbaryl?

Currently, there are over 190 registered pesticide products that contain carbaryl. These include sprays, dusts, granules, and water soluble packages. Many of these products can be used on agricultural crops and home gardens, lawns and other ornamental plants. Others are used around the outside of homes and on anthills.

**IMPORANT:** Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 800-222-1222. If you wish to discuss a pesticide problem, please call 1-800-858-7378.

### How does carbaryl work?

When insects eat or touch carbaryl, it over stimulates their nervous systems. Nerves pass along signals to other nerves using the signaling chemical, acetylcholine. When it reaches its target, it has a stimulating effect on these nerves. Normally, an enzyme then quickly breaks down this signaling chemical. This allows nerves to return to rest. Carbaryl prevents this enzyme from working properly. This keeps affected nerves stimulated continuously, resulting in the inability to contract breathing muscles, ultimately causing the death of insect pests.

Carbaryl also acts as a plant growth regulator, but the way it works is not fully known. However, it is similar to certain plant hormones. It also breaks down into another chemical which is a known plant hormone.

### How might I be exposed to carbaryl?

People are most commonly exposed to very low levels of carbaryl through their diet. Exposure can also occur if you breathe it in or get it on your skin or in your eyes. For example, exposure can occur while applying sprays or dusts during windy conditions. People may also be exposed if they eat, drink, or smoke if they don't wash their hands after using a product. You can limit exposure to pesticide products by carefully following label instructions.

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### **What are some signs and symptoms from a brief exposure to carbaryl?**

Soon after exposure, weakness, dizziness, and sweating are commonly reported. Pinpoint pupils, lack of coordination, muscle twitching, and slurred speech have also been reported. People may also experience headaches, nausea, vomiting, stomach cramps, diarrhea, or drooling. The severity of these effects can depend on the dose and the person.

In cases of severe poisoning, high blood pressure, decreased muscle tone, and seizures have been reported. Other serious signs include difficulty breathing, constriction of the airways, mucous production, fluid buildup in the lungs, and reduced heart and lung function.

### **What happens to carbaryl when it enters the body?**

When eaten, carbaryl is absorbed into the body. However, skin absorption is slower. In an animal study, peak blood levels of carbaryl were found 15 to 30 minutes after it was eaten but 4 to 12 hours after skin contact.

Once inside, it moves in the blood stream to many tissues. Carbaryl works on nerves by binding to certain enzymes. However, this is not permanent. In an animal study, half of the carbaryl became unbound in less than two hours.

Carbaryl is then broken down into inactive products and is removed from the body. In one study rats were fed a single dose of carbaryl. Less than half of the carbaryl remained after two hours; about 97% percent left the body in urine and feces within seven days.

### **Is carbaryl likely to contribute to the development of cancer?**

In studies, mice were fed high daily doses of carbaryl for 2 years. Male mice had an increased number of blood vessel tumors at all dose levels. At the highest dose, both male and female mice had an increased number of kidney and liver cancers. Based on these studies, the Environmental Protection Agency (EPA) has classified carbaryl as 'likely to cause cancer.' In 2007, the EPA estimated the lifetime cancer risk from eating foods with carbaryl residues to be less than 1 in 30 million.

### **Has anyone studied non-cancer effects from long-term exposure to carbaryl?**

Scientists have also tested whether carbaryl causes developmental or reproductive effects in rats and rabbits. In these studies, animals were fed low to moderate daily doses of carbaryl throughout their lives or during their pregnancies. Developing rats weighed less and some of their bones did not fully form. After birth, fewer young rats survived than normal. Also, changes in the length of parts of the brain were observed in adults and their young. At moderate doses with rabbits, their young had lower body weights. No reproductive effects were observed in test animals.

Carbaryl is not likely to act as an endocrine disruptor. It does not interact with the estrogen, androgen, or thyroid pathways.

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In a two year study, rats were fed moderate to high daily doses of carbaryl. At the highest dose, rats developed cataracts, lung inflammation, and damage to certain muscles and nerves. They also showed effects to their liver, kidneys, and thyroid. At the highest two doses, carbaryl blocked an important enzyme in blood that prevents the overstimulation of nerves. Vomiting, tearing, drooling, and tremors have also been reported in long-term feeding studies with dogs.

### **Are children more sensitive to carbaryl than adults**

Children may be especially sensitive to pesticides compared to adults. In a study with rats, carbaryl's effect on the brain of young and adult rats was compared. Young rats were found to be 80% more sensitive than adults.

Young children may also act in ways that put them at greater risk of being exposed. For example, they may spend more time near the ground. They may also be more likely to place their hands in their mouths after touching treated surfaces.

### **What happens to carbaryl in the environment?**

At soil and water surfaces, microbes break carbaryl down quickly. Half-lives are 4 days in water and 16 days on soil surfaces. Sunlight can also break carbaryl down. When carbaryl was not broken down by water but was still exposed to sunlight, a half-life of 21 days was reported. Carbaryl has a moderate ability to dissolve in water and migrate through soil toward ground water. Deep down in soil, where oxygen is absent, carbaryl breaks down more slowly. A half-life of 72 days has been reported. In water and soil, carbaryl has a low potential to make vapors into the air.

When carbaryl gets on leaf surfaces, very little is absorbed into the leaf. However, carbaryl is more readily taken up by the roots and moves to areas of active growth. On leaf surfaces, a half-life of 3.7 days has been reported.

### **Can carbaryl affect birds, fish, or other wildlife?**

Carbaryl is practically non-toxic or slightly toxic to birds, and slightly to moderately toxic to mammals. However, it is moderately to highly toxic to fish and highly toxic to earthworms and honey bees. Carbaryl is very highly toxic to shrimp, waterfleas, and stoneflies. The main breakdown product of carbaryl is also highly toxic to some fish.

In long-term studies, birds and mammals were fed low doses of carbaryl. There were decreases in the number of eggs laid and young that survived, respectively. There is some evidence that carbaryl can affect hormone systems in fish at low doses.

### **Where can I get more information?**

For more detailed information visit the list of referenced resources below, call NPIC between 8:00 AM and 12:00 PM Pacific Time (11:00 AM to 3:00 PM Eastern Time), Monday - Friday, at 800-858-7378, or visit us on the web at [npic.orst.edu](http://npic.orst.edu). NPIC provides objective, science-based answers to questions about pesticides.

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