

# CARBARYL

## Overview

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**Carbaryl** is a general use [carbamate](#) pesticide that acts primarily as an insecticide, but is also competent as a molluscicide and acaricide. It is used on a variety of crops including soy, corn, and citrus, and is also applied to livestock and home garden uses. Carbaryl is a [Cholinesterase Inhibitor](#), and commonly causes acute symptoms in both laboratory studies and in occupational human exposures. It may also cause mutagenic effects in humans. As with many other insecticides, carbaryl negatively impacts several aquatic organisms and poses a threat to populations of beneficial insects such as bees. Studies have also demonstrated carbaryl's ability to bioaccumulate in aquatic bottom-feeders, such as crawfish and snails.

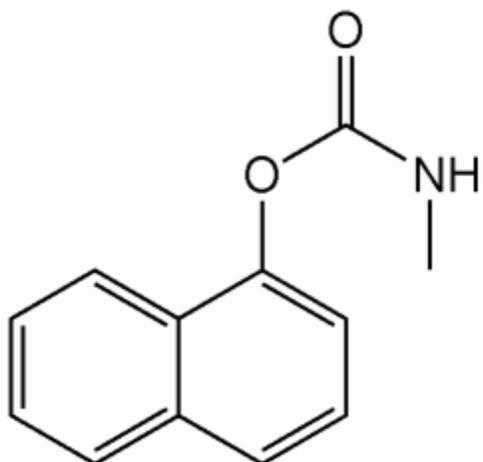
### Just the facts

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Physical Information
Name: Carbaryl
Use: <a href="#">insecticide</a>
Source: synthetic chemistry
Recommended daily intake: none
Absorption: dermal, ingestion
Sensitive individuals: workers

## Chemical Structure

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Structure retrieved from [PAN](#)

## Chemical Description

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The chemical name of carbaryl is 1-naphthyl methylcarbamate. Discovered in 1958 by Union Carbide, the company now infamous for the Bhopal disaster of 1984, carbaryl is synthesized through treating methyl isocyanate with 1-naphthol. The resulting product is a solid, usually colorless crystal that is odorless and soluble in water ([EPA](#)). Depending on the production process, the crystals can take on a white or gray hue, and are stable against heat, light, and acids ([EXTOXNET](#)).

## Uses

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Carbaryl is commonly sold under the trade name Sevin ([EPA](#)), and goes by trade names such as Adios, Carbamec, Denapon, Hexavin, and Panam ([EXTOXNET](#)). Its primary use is as an [insecticide](#) on various commercial crops, including but not limited to corn, soybean, cotton, citruses, pears, and nuts. In addition to also being effective as a molluscicide and acaricide, carbaryl can also be used to treat pest infestations, such as that due to species of lice, on livestock, poultry, pets, and in the case of head lice, on people.

However, carbaryl is utilized in settings other than farmland. It is also heavily used in suburban yard and garden settings, and is frequently used to raise and maintain ornamental and shade trees ([EXTOXNET](#)). In each of these settings, the chemical is available in a variety of mediums, the most usable of which are in the form of baits, dusts, wettable powders, and granules ([EXTOXNET](#)).

## Metabolism

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Carbaryl affects its insect and mollusk targets through both ingestion and dermal contact ([EXTOXNET](#)). The chemical is a [Cholinesterase Inhibitor](#), which inhibits the cholinesterase enzyme from degrading acetylcholin, eventually leading to interference in the host's nervous system. Although typically fatal in insects, carbaryl is detoxified, metabolized, and excreted by vertebrate hosts, especially humans and other mammals. In particular, the chemical does not seem to concentrate in fats or milks. Mammals that ingest carbaryl metabolize up to 85% of the chemical within 24 hours ([EXTOXNET](#)).

## Health Effects

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As a cholinesterase inhibitor, however, carbaryl can have serious acute health impacts on mammals, despite the rapid metabolism process. According to the EPA, occupational exposure to carbaryl can result in nausea, vomiting, blurred vision, coma, and difficulty breathing ([EPA](#)). Likewise, laboratory tests in mice, rabbits, and guinea pigs indicates that the chemical can have a severe acute impact on some mammalian organisms ([EPA](#)). The oral LD50 in rats can range from 250 mg/kg to 850 mg/kg, and dermal values are somewhat similar ([EXTOXNET](#)). Like other mammals, humans are affected by carbaryl via skin contact, ingestion, and inhalation. Acute human symptoms, given a large enough exposure, can also include burns, irritation, and stomach cramps; however, as noted above, the severity of the symptoms is dependent on the route of transmission ([PAN](#)). According to EXTOXNET, the only human fatality from direct exposure to carbaryl was through intentional ingestion.

As pertains to these acute effects, carbaryl is officially regarded as a Type II Moderately Hazardous Pesticide. Likewise, regulatory organizations and agencies such as the EPA list carbaryl as a suspected carcinogen, endocrine disruptor, reproductive toxicant, and developmental toxicant ([PAN](#)). And although evidence is inconclusive, some EPA findings have also observed symptoms such as lasting headaches, memory loss, and muscle weakness resulting from prolonged low-level carbaryl exposure, suggesting some potential for the chemical to cause chronic effects ([EPA](#)).

One conclusive influence of the chemical, however, is in its ability to cause mutagenic effects in some animals. In laboratory studies of rats, carbaryl has been shown to affect cell division and growth. There is a possibility that this same effect may occur in the human stomach upon ingestion of the chemical; however, this has not been studied conclusively ([EXTOXNET](#)). The same amount of evidence also exists for carbaryl's potential to affect the immune system in animals and insects.

## Regulation

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Carbaryl is categorized by the EPA as a [General Use Pesticide](#); however, it is important to recall that the severity of carbaryl depends on its mode of production and transmission pathway.

EXTOXNET lists the following example:

*"It [carbaryl] is categorized as toxicity class I - highly toxic for Tercyl; toxicity class II - moderately toxic for Sevin 803; and toxicity class III - slightly toxic for some other products."*

Due the variable nature of the chemical, all products containing carbaryl are required to display key words of caution such as "Danger," "Poison," and "Warning."

## Ecological Effects

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Like other insecticides, carbaryl poses some ecological and environmental risks as well, which can both directly and indirectly impact humans. Carbaryl has low persistence in soil, and is rapidly broken down by microbial communities in surface water. However, the chemical can pose a threat to certain aquatic organisms. Carbaryl is somewhat toxic to fish, with some LC50s ranging from 1 to 10 mg/L. Because fish too rapidly metabolize the chemical, it does not pose a

significant threat to bioaccumulation in the aquatic environment, but some bottom-feeders, such as catfish or crawfish, can accumulate the chemical in their tissues ([EXTOXNET](#)).

Out of water, carbaryl is relatively non-toxic to most animal life. For instance, the chemical is practically non-toxic to birds. However, as it affects insects in general, carbaryl can inflict a heavy blow to beneficial insect species, such as bees and other pollinators.

Source : <http://www.toxipedia.org/display/toxipedia/Carbaryl>