

What is MGK-264?

MGK-264 is a man-made chemical that acts as a synergist. Synergists by themselves are not designed to harm insects. They work with pesticides to increase their success in controlling insects. MGK-264 is often mixed with natural [pyrethrins](#) or man-made [pyrethroid](#) insecticides.

MGK-264 has been used in pesticide products since the 1940s when it was first registered in the United States. The chemical name for MGK-264 is N-octyl bicycloheptene dicarboximide.



What are some products that contain MGK-264?

MGK-264 is found in more than 1,000 registered [pesticide products](#). Many of these products can be used inside and outside of homes, depending on label instructions. Some are designed for use on pets for [flea](#) and [tick](#) control. Products come in a variety of [forms](#). These include foggers, dusts, liquids, pet shampoos, and ready-to-use sprays. MGK-264 is registered for use against many pests, including [ants](#), [aphids](#), flies, and [spiders](#).

MGK-264 is also used in non-residential settings, including food-handling or agricultural structures. It is also used on non-food plants and animals. There are some uses on beef and dairy cattle, but there are no agricultural crop uses for MGK-264.

Always [follow label instructions](#) and take steps to minimize 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 1-800-222-1222. If you wish to [discuss a pesticide problem](#), please call 1-800-858-7378.

How does MGK-264 work?

MGK-264 does not kill insect directly. Instead, it increases the ability for the pesticide to control the pest. Enzymes help insects get rid of some [insecticides](#). The addition of MGK-264 stops some of these enzymes and slows down the process. This gives the insecticide more time to work and these insects are less likely to recover. The result is that some insecticides work better when used with MGK-264.



How might I be exposed to MGK-264?

You may be exposed to MGK-264 if you breathe it in, eat it, touch it, or if you get it in your eyes. For example, when applying a liquid pesticide, a person may accidentally touch or inhale the mist. Avoid touching treated areas until after the product has dried completely. You could also be exposed if you use a product and smoke, eat, or use the bathroom before washing your hands. Your skin may be exposed when using a flea and tick shampoo on your pets.

Limit exposure to pesticide products by carefully [following label instructions](#). NPIC also has a fact sheet on [ways to minimize exposure](#). Remember to [store pesticides properly](#) and take care when [transporting them in your car](#). When transporting pesticides, secure containers so they don't tip or spill.

What are some signs and symptoms from a brief exposure to MGK-264?

It is rare for people to be exposed to MGK-264 by itself. It is almost always found with other active ingredients in pesticide products. By itself, it is considered low to very low in toxicity if it is inhaled or eaten, based on animal studies. It does not cause skin irritation and is not a skin sensitizer. Rabbits exposed to MGK-264 had eye irritation for seven days. No information was found about human health effects as a result of exposure to MGK-264 alone.

See NPIC's [fact sheets](#) for signs and symptoms of exposure to other pesticides that may be mixed with MGK-264. These may include [pyrethrins](#) or [pyrethroids](#), as well as others.



What happens to MGK-264 when it enters the body?

When MGK-264 was applied to the skin of rats, absorption into the body was slow. Between 11-15% of the dose was absorbed over 12 hours of contact. The majority of MGK-264 was not absorbed by the skin. MGK-264 was eliminated from rats in both urine and feces. No adverse health effects were seen in these rats. Based on studies with volunteers, about 10% of the applied dose was absorbed through human skin.

In one study, rats were fed a single dose of MGK-264. It was absorbed by the gut and moved to many areas of the body. The largest amounts were found in the liver, stomach, and intestines. However, most of the MGK-264 was quickly broken down and rapidly left the body. After 48 hours, more than 85% of the dose left the body in urine and feces.

Is MGK-264 likely to contribute to the development of cancer?

Laboratory rats and mice were fed high daily doses of MGK-264 for 1.5 to 2 years. Male rats fed these doses had an increased rate of thyroid tumors. Mice had an increased rate of liver tumors. MGK-264 showed only weak evidence of damaging or altering genes in one study. Many other studies show no evidence of gene damage. Based on these studies, the Environmental Protection Agency (EPA) has classified MGK-264 as a possible human carcinogen.

Has anyone studied non-cancer effects from long-term exposure to MGK-264?

There were no direct effects to offspring after pregnant rats and rabbits were fed MGK-264. However, mother rabbits had increased salivation at moderate doses, and some of them died or had reduced litter sizes at high doses. Mother rats had lower body weights at the high dose level.

Researchers examined whether MGK-264 fed to rats would change their reproduction over three generations. No reproductive effects were seen at high doses. In another two-generation rat-feeding study, there were also no reproductive effects. However, at the high dose adult rats showed liver changes and weight loss.

When rats were forced to breathe low levels of MGK-264 for three months, their throats were injured. In long-term, high dose feeding studies with rats and dogs, there were effects to the liver. Long-term, high dose feeding studies with mice revealed liver and kidney effects.

The EPA has evaluated MGK-264 for its potential as an endocrine disruptor. These studies found evidence of interaction with the estrogen and thyroid pathways, but not the androgen pathway, in mammals. Effects related to these interactions were found at high doses.

Are children more sensitive to MGK-264 than adults ?

[Children may be especially sensitive to pesticides](#) compared to adults. There are currently no studies showing that children are more sensitive to MGK-264 than adults. The EPA determined it is not expected to be more risky to children than adults.



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

What happens to MGK-264 in the environment ?

In air, MGK-264 is very short-lived. Its [half-life](#) is less than two hours. However, when in water, with or without sunlight, it is very stable. MGK-264 can linger a long time in water without breaking down. In soil, it is broken down very slowly and has a half-life of about 341 days. When liquid products dry on surfaces, MGK-264 has a moderate ability to move into air as vapor.

MGK-264 can stick to soil. It will move easily toward groundwater through soils with low organic content like sand. However, it is immobile in clays. MGK-264 dissolves in water moderately well. However, when it reaches water, some may stick to sediment.

Can MGK-264 affect birds, fish, or other [wildlife](#) ?

MGK-264 is practically non-toxic to birds and mammals. However, it is moderately toxic to fish and water fleas. There is potential for MGK-264 to build up in fish. There is no evidence of hormonal impacts of MGK-264 in fish or amphibians.

There are no studies that look at bee toxicity. However, most products with MGK-264 are combined with other insecticides. These are often toxic to bees and other beneficial insects.

Where can I get more information?

For more detailed information about MGK-264 please visit the list of [referenced resources](#) or call the National Pesticide Information Center, between 8:00 AM and 12:00 PM Pacific Time (11:00 AM to 3:00 PM Eastern Time), Monday - Friday, at 1-800-858-7378 or visit us on the web at <http://npic.orst.edu>. NPIC provides objective, science-based answers to questions about pesticides.

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References

1. *EDSP Weight of Evidence Conclusions on the Tier 1 Screening Assays for the List 1 Chemicals*; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, Office of Pesticide Programs, U.S. Government Printing Office: Washington, DC, 2015.
2. *EFED Registration Review Problem Formulation for MGK-264*; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, U.S. Government Printing Office: Washington, DC, 2012.
3. *HED Chapter of the Reregistration Eligibility Decision Document (RED) N-Octyl bicycloheptene dicarboximide (MGK-264)*; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, U.S. Government Printing Office: Washington, DC, 2004.
4. *Reregistration Eligibility Decision Document (RED) N-Octyl bicycloheptene dicarboximide (MGK-264)*; EPA-738-R-06-006; U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, U.S. Government Printing Office: Washington, DC, 2004.
5. Selim, S.; Gabriel, K. L.; Preiss, F. J. Absorption, distribution, metabolism, and excretion of N-octylbicycloheptene dicarboximide (MGK 264) administered dermally to rats. *Cutan. Ocul. Toxicol.* 18, 4, 311-323, 1999.
6. Selim, S.; Gabriel, K. L.; Preiss, F. J. Absorption, distribution, metabolism, and excretion of N-octylbicycloheptene dicarboximide (MGK 264) administered orally to rats. *Cutan. Ocul. Toxicol.* 18, 4, 291-310, 1999.
7. Shelanski, M. V.; Gittes, H. R.; Benhayem, S. Three-generation study of N-octyl bicycloheptene dicarboximide in rats. *Toxicol. Appl. Pharm.* 9, 3, 555-560, 1966.

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