



Product Safety Assessment

Hexaflumuron

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Names

- CAS No. 86479-06-3
- N-(((3,5-Dichloro-4-(1,1,2,2-tetrafluoroethoxy)phenyl)amino)carbonyl)-2,6-difluorobenzamide
- 1-[3,5-dichloro-4-(1,1,2,2-tetrafluoroethoxy)phenyl]-3-(2,6-difluorobenzoyl)urea
- SHATTER[®] Termite Bait
- CONSULT[®] F Insecticidal Chemical
- Sentricon[®] *Termite Colony Elimination System*
- Hexaflumuron
- RECRUIT[®] AG Termite Bait
- RECRUTE[®] Pro Termite Bait
- Hex-Pro[™] Termite Baiting System
- SENTRI*TECH System
- Sentricon[™] IG Termite Bait
- Sentricon[™] AG Termite Bait

Much of the information in this document relates to the registration and sale of hexaflumuron in the United States of America. For details applicable to other countries of interest, consult the relevant [Product Label](#), [Safety Data Sheet](#), or [Contact Us](#).

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Product Overview

- Hexaflumuron is the common name for the active ingredient in several termite control products registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. Hexaflumuron is an insect growth regulator (IGR) insecticide. Its mode of action is the disruption of chitin synthesis in developing termites. Chitin is the main component of the termite exoskeleton.¹ For further details, see [Product Description](#).
- Hexaflumuron is an odorless white solid that is typically formulated into low concentration solid briquettes and contained within tamper-resistant bait delivery systems.² For further details, see [Product Description](#).
- Hexaflumuron and its end-use termite bait products were first registered by the Environmental Protection Agency (EPA) in 1994, and hexaflumuron became the first U.S. registration granted under the EPA's designation as a reduced-risk pesticide. This registration launched the rapid adoption of a new standard for termite control, the Sentricon[®] *Termite Colony Elimination System* using hexaflumuron-based termite bait formulations.
- Among termite control products, a new standard for low environmental and human risk was established based on continuous monitoring and baiting only when the pest is present. The technology enabled an Integrated Pest Management approach using monitoring and targeted delivery of the highly specific bait product. Because it eliminates termite colonies threatening

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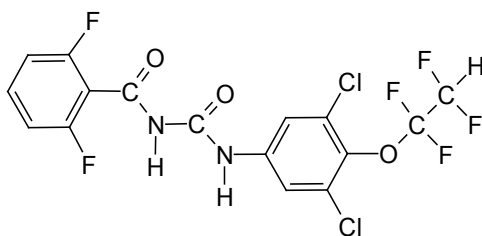
structures using a targeted approach, the Sentricon[®] System delivers unmatched technical performance, environmental compatibility, and reduced human risk.

- Dow AgroSciences was recognized by the U.S. EPA with the U.S. Presidential Green Chemistry Challenge Award in 2000 for the Sentricon[®] System, based on its fundamental and innovative ability to incorporate the principles of “green” chemistry into chemical design, manufacture, and use.
- Hexaflumuron is registered for use to protect structures against subterranean termite colonies. It is used in both above-ground and in-ground bait stations as part of a termite monitoring and control program. Target sites can include buildings, fences, utility poles, decking, landscape plantings, trees, and other wood structures that can be damaged by termite foraging and feeding. For further details, see the relevant [Product Labels](#) and [Product Uses](#).
- Although those working with the active ingredient could be exposed during manufacturing or formulating operations, the potential for the applicator, homeowner, or environment to be exposed is virtually eliminated because of the low levels of active ingredient and tamper-resistant bait stations.³ For further details, see [Exposure Potential](#).
- Eye contact with hexaflumuron solid or dust may cause irritation or corneal injury due to mechanical action. Skin contact is essentially nonirritating. A single inhalation exposure to product dust is not anticipated to cause adverse effects. Hexaflumuron has very low toxicity if swallowed.⁴ For further details, see [Health Information](#) or the [Safety Data Sheet](#).
- Hexaflumuron is very highly toxic to aquatic invertebrate organisms on an acute basis, but practically nontoxic to birds on an acute basis. Its bioconcentration potential is high. Hexaflumuron passes OECD test(s) for ready biodegradability. It can be considered to be moderately persistent in the environment, and would be removed by common wastewater-treatment processes.⁵ For further details, see the relevant [Product Label](#) or the [Safety Data Sheet](#).
- Hexaflumuron formulations are stable under normal storage and use conditions.⁶ Consult the relevant [Product Label](#) for specific use and storage information. For further details, see [Physical Hazard Information](#).

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Manufacture of Product

- **Manufacture** – Hexaflumuron is manufactured in France and Germany using a proprietary manufacturing process and is formulated into end-use termite bait products in the United States.
- **Process** – Hexaflumuron is produced using a complex and proprietary process involving a series of reaction and purification steps. The chemical structure of hexaflumuron is shown below:



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Product Description^{7,8,9}

Hexaflumuron is a benzoylphenyl urea-type insecticide and is the common name for N-(((3,5-dichloro-4-(1,1,2,2-tetrafluoroethoxy)phenyl)amino)carbonyl)-2,6-difluorobenzamide. It is the active ingredient in several termite control products registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. Hexaflumuron was the first active ingredient to

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be registered with the U.S. Environmental Protection Agency (EPA) as a reduced-risk pesticide. A reduced-risk pesticide is one that the EPA believes has low impact on human health, low toxicity to non-target organisms, and low potential for groundwater contamination. Hexaflumuron's mode of action is to inhibit chitin synthesis. Termites produce chitin to form or maintain an exoskeleton.

Hexaflumuron is an odorless white solid that is formulated into low-concentration solid briquettes that are contained within tamper-resistant bait stations. Formulated hexaflumuron briquettes contain about 0.5% of the active ingredient, with the balance comprised almost entirely of cellulose.

Hexaflumuron formulations have been marketed under the trade names RECRUIT® AG termite bait, SHATTER® termite bait, SENTRI*TECH, RECRUTE® Pro, Hex-Pro™ Termite Baiting System, Sentricon™ IG Termite Bait, Sentricon™ AG Termite Bait, Sentricon® *Termite Colony Elimination System*.

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Product Uses & Regulatory Information^{10,11}

Hexaflumuron is used to control subterranean termite colonies. It is used in above-ground and in-ground bait stations as part of termite monitoring and control programs. Target sites include buildings, fences, utility poles, decking, landscape plantings, trees, and other wood structures that can be damaged by termite foraging and feeding. Hexaflumuron products are used only by licensed pest management professionals. Hexaflumuron is registered by the U.S. Environmental Protection Agency (EPA) for use as termite bait.

End-use termite bait formulations containing hexaflumuron are registered and sold in more than 25 countries including Australia, Brazil, China, France, Japan, Spain, and the United States. Formulations are packaged into bait stations for in-ground installation around structures and in stations for above-ground installation.

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of products containing hexaflumuron. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Product Label](#), [Safety Data Sheet](#), or [Contact Us](#).

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Exposure Potential^{12,13}

Hexaflumuron is used in the formulation of commercial termite control products. Based on the uses for hexaflumuron, the public could be exposed through:

- **Workplace exposure** – Exposure could occur in facilities that manufacture or formulate hexaflumuron. Those working with hexaflumuron in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit exposure. Pest management professionals using this product and following label precautions are unlikely to be exposed. See [Health Information](#), [Product Label](#), and [Safety Data Sheet](#).
- **Consumer exposure to products containing hexaflumuron** – Direct consumer contact with this material is not likely because it is applied only in termite bait stations when it is being used for termite control in residences or public structures. Hexaflumuron has a very low vapor pressure and this, along with the properties of the bait and bait station, suggests that the

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RECRUIT[®] AG product should have minimal impact on indoor air.¹⁴ See [Health Information](#) and [Product Label](#).

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, ditches, sewers, waterways, or groundwater. Sweep up small spills and place in a container suitable for disposal. Hexaflumuron is very highly toxic to aquatic invertebrates and practically nontoxic to birds when ingested. Consult the relevant [Safety Data Sheet](#) or [Product Label](#) for more information. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to keep the material contained and out of waterways. Personnel engaged in clean up of spills must wear appropriate protective equipment. Contact Dow AgroSciences in the U.S. at **800-992-5994** for clean-up assistance. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **In case of fire** – Consult the [Safety Data Sheet](#) for specific firefighting measures. Use foam, dry-chemical, or carbon-dioxide extinguishers to fight the fire. A water spray may also be used. A foam system is preferred because uncontrolled water can spread potential contamination. Toxic and irritating gases and fumes can be formed in a fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Follow emergency procedures carefully. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **Emergency response information** – In the case of an emergency such as poisoning, product spillage, or fire associated with a Dow AgroSciences product in the U.S., call **800-992-5994**. More information is available at www.dowagro.com/company/contact/index.htm. For emergencies outside the U.S., use the phone number listed on the Safety Data Sheet for the appropriate country. In some countries, the emergency response number is also provided on the artwork of the commercial package.

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Health Information¹⁵

Laboratory testing – The active substance, hexaflumuron, has been comprehensively evaluated under regulatory frameworks used for registration and approval of pesticide products in the U.S., EU, Australia, and other countries (e.g., U.S. Federal Insecticides, Fungicides, Rodenticides Act and EU Directive 98/8/EC (Biocidal Product Directive). These legal frameworks require laboratory testing for potential acute, short-term and long-term health effects. These tests help scientists determine how chemicals might affect humans, domestic animals, or wildlife in cases of overexposure. Pesticide products used according to label directions are unlikely to cause toxic effects. The amount of pesticide that people and pets may be exposed to is very low compared to that used in laboratory testing.

Health information for products containing hexaflumuron is summarized on the relevant [Safety Data Sheets](#). It is important to note that health risks associated with individual products may vary based on their formulation or intended use. The [Safety Data Sheet](#) is the preferred source for specific health information

Based on the characteristics of hexaflumuron and hexaflumuron-containing products, no health effects are anticipated under normal use. Because hexaflumuron is used only in self-contained bait stations to control termites around structures, fence posts, utility poles, and landscape plantings, it is not expected to pose a threat to human health.

An overview of health information for technical grade (nearly pure) hexaflumuron appears below.

Eye contact – Contact with product solid or dust may cause irritation or corneal injury

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Skin contact – Contact is essentially nonirritating to the skin. Prolonged contact is unlikely to result in absorption of harmful amounts.

Inhalation – No adverse effects are anticipated by a single inhalation exposure to product dust.

Ingestion – This material has very low toxicity if swallowed. Harmful effects are not anticipated from swallowing small amounts.

Repeated exposure – In laboratory tests, effects have been reported on the liver, blood, and spleen. This material may cause methemoglobinemia, which impairs the ability of the blood to transport oxygen.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

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Environmental Information^{16,17,18}

Environmental fate data indicate hexaflumuron is strongly bound to soil and has very low water solubility, indicating a low potential for soil leaching.

Because hexaflumuron is used only in self-contained bait stations to control termites around structures, fence posts, utility poles, and landscape plantings, it is not expected to pose a threat to wildlife.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

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Physical Hazard Information^{19,20}

Hexaflumuron formulations are stable under normal use and storage conditions. Exposure to very high temperatures can cause this material to decompose. Keep out of the reach of children.

Good housekeeping and control of product dusts during manufacturing are necessary for the safe handling of this product. Avoid contact with oxidizing materials and strong bases. Consult the [Product Label](#) for specific use and storage information.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

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Additional Information

- Safety Data Sheets and Product Labels (www.dowagro.com/products/label/index.htm)
- Contact Dow AgroSciences Australia (www.dowagro.com/au/contact/)
- Contact Dow AgroSciences France (www.dowagro.com/fr/contact/)
- Contact Dow AgroSciences U.S. (www.dowagro.com/company/contact/index.htm)
- CONSULT[®] F Insecticidal Chemical
- Sentricon[™] IG and AG Termite Bait Systems, Australia (www.dowagro.com/au/prod/sentriconll.htm)
- SENTRI[®] TECH Termite Colony Elimination System, France (www.dowagro.com/sentritech/fr/)
- RECRUTE[®] Pro Termite Bait Specimen Label, Dow AgroSciences France, (<http://www.dowagro.com/sentritech/fr/news200607.htm>)

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- *SHATTER[®] Termite Bait Specimen Label*, Dow AgroSciences LLC, Label code: D02-326-006, Revised June 16, 2011 (www.dowagro.com/products/label/index.htm)
- *Hexaflumuron (General Fact Sheet)*, National Pesticide Telecommunications Network (NPTN), Oregon State University, July 18, 2000 (<http://npic.orst.edu/factsheets/hexgen.pdf>)
- *Hexaflumuron Pesticide Fact Sheet*, www.beyondpesticides.org webpage (<http://www.beyondpesticides.org/info/services/pesticidefactsheets/toxic/hexaflumuron.htm>)
- Hexaflumuron: Registration Review Documents, Docket ID: EPA-HQ-OPP-2009-0568, U.S. Environmental Protection Agency, September 2009 (<http://www.regulations.gov/#!docketDetail;D=EPA-HQ-OPP-2009-0568>)
- Hexaflumuron (RECRUIT[®] Termite Bait) Registration of Major Label Change 6/96, New York State Department of Environmental Conservation, June, 25, 1996 (<http://pmep.cce.cornell.edu/profiles/insect-mite/fenitrothion-methylpara/hexaflumuron/maj-change-label-hexaflum.html>)
- Public Report 2003-5 Noviflumuron: Tracking ID Numbers CRR-193920 through CCR-193923, California Department of Pesticide Regulation, May 2003 (<http://www.cdpr.ca.gov/docs/registration/ais/publicreports/5816.pdf>)

For more business information about hexaflumuron, visit the [Dow AgroSciences LLC](http://www.dowagro.com/) website at www.dowagro.com/.

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References

- ¹ *Hexaflumuron (General Fact Sheet)*, National Pesticide Telecommunications Network (NPTN), Oregon State University, July 18, 2000, page 1.
- ² *SHATTER[®] Termite Bait Cartridge Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code: 102630, June 7, 2005, page 1.
- ³ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, page 3.
- ⁴ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, pages 1–2 and 4–5.
- ⁵ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, page 5.
- ⁶ *SHATTER[®] Termite Bait Cartridge Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code: 102630, June 7, 2005, page 2.
- ⁷ *Hexaflumuron (General Fact Sheet)*, National Pesticide Telecommunications Network (NPTN), Oregon State University, July 18, 2000, page 1.
- ⁸ *Hexaflumuron Insecticide Active Ingredient Quick Reference Guide*, Dow AgroSciences LLC, June 19, 2001, page 1.
- ⁹ *SHATTER[®] Termite Bait Cartridge Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code: 102630, June 7, 2005, page 1.
- ¹⁰ *SHATTER[®] Termite Bait Specimen Label*, Dow AgroSciences LLC, Label code: D02-326-006, Revised June 16, 2011, page 1.
- ¹¹ *Hexaflumuron Insecticide Active Ingredient Quick Reference Guide*, Dow AgroSciences LLC, June 19, 2001, page 1.
- ¹² *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, pages 2–3 and 5.
- ¹³ *SHATTER[®] Termite Bait Cartridge Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code: 102630, June 7, 2005, pages 1 and 3.
- ¹⁴ Hexaflumuron (RECRUIT[®] Termite Bait) Registration of Major Label Change 6/96, New York State Department of Environmental Conservation, June, 25, 1996
- ¹⁵ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, pages 1–2 and 4–5.

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- ¹⁶ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, pages 1 and 5.
- ¹⁷ *Hexaflumuron Insecticide Active Ingredient Quick Reference Guide*, Dow AgroSciences LLC, June 19, 2001, pages 1–2.
- ¹⁸ Public Report 2003-5 Noviflumuron: Tracking ID Numbers CRR-193920 through CCR-193923, California Department of Pesticide Regulation, May 2003, pages 1–2.
- ¹⁹ *Hexaflumuron Technical Material Safety Data Sheet*, Dow AgroSciences LLC, September 4, 2009, pages 3 and 4.
- ²⁰ *SHATTER[®] Termite Bait Cartridge Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code: 102630, June 7, 2005, pages 1 and 2.

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NOTICES:

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