



Product Safety Assessment

Noviflumuron

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Names

CAS No. 121451-02-3

- N-(((3,5-Dichloro-2-fluoro-4-(1,1,2,3,3,3-hexafluoropropoxy)phenyl)amino)carbonyl)-2,6-difluorobenzamide
- (RS)-1-[3,5-Dichloro-2-fluoro-4-(1,1,2,3,3,3-hexafluoropropoxy)phenyl]-3-(2,6-difluorobenzoyl)urea
- Sentricon™ *Termite Colony Elimination System*
- Noviflumuron
- Noviflumuron Technical
- Noviflumuron (XDE-007) Technical
- Noviflumuron 50% Manufacturing Concentrate
- RECRUIT™ III Termite Bait
- RECRUIT III AG Termite Bait
- RECRUIT IV Termite Bait
- RECRUIT IV AG Termite Bait
- RECRUIT HD Termite Bait

Much of the information in this document relates to the registration and sale of noviflumuron 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

- Noviflumuron 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. Noviflumuron 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](#).
- Noviflumuron is an odorless white solid that is formulated into low-concentration solid cellulose-based bait materials. The baits are packaged in Sentricon® Baitube® and durable bait matrix devices designed for use with Sentricon in-ground stations or within tamper-resistant bait stations for above-ground use in or around structures. For further details, see [Product Description](#).
- Noviflumuron was specifically developed for urban insect pests and was registered with the U.S. Environmental Protection Agency (EPA) under the Agency's "reduced-risk" pesticide program. Noviflumuron-based termite baits are used with the Sentricon® Termite Colony Elimination System for prevention and elimination of subterranean termite colonies. The Sentricon® System forms the basis of an on-going program providing structural protection against subterranean termites. It utilizes a continuous monitoring and baiting

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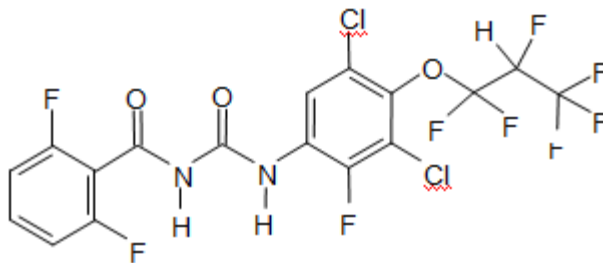
strategy in which insecticide bait enclosed in a station is delivered to the target site. This approach of a highly-specific bait product sets the standard for low environmental impact and reduced human risk.²

- 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.¹
- Noviflumuron 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, and landscape plantings. For further details, see the relevant [Product Labels](#) and [Product Uses](#).
- Although individuals working directly with noviflumuron could be exposed during manufacturing or formulating operations, the potential for applicator, homeowner, or environmental exposure is virtually eliminated because of the low levels of active ingredient in bait formulations which are contained in tamper-resistant bait stations.^{3,4} For further details, see [Exposure Potential](#).
- Eye contact with noviflumuron solid or dust may cause slight, temporary eye irritation. Brief skin contact is essentially nonirritating. A single inhalation exposure to product dust is not anticipated to cause adverse effects. Noviflumuron has very low toxicity if swallowed.³ For further details, see [Health Information](#) or the [Safety Data Sheet](#).
- Because noviflumuron is used at low dosages (0.5% active ingredient) in a termite bait matrix enclosed within a station, the potential for exposure to non-target terrestrial and aquatic wildlife species is extremely low.^{5,6} For further details, see [Environmental Information](#) or the relevant [Product Label](#).
- Noviflumuron formulations are stable under normal storage and use conditions.⁷ 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** – Noviflumuron is produced in Germany using a proprietary manufacturing process and formulated into end-use termite bait products in the United States.
- **Process** – Noviflumuron is produced using a complex and proprietary process involving a series of reaction and purification steps. The structure of noviflumuron is shown below.



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Product Description^{8,9}

Noviflumuron is a benzoylphenyl urea-type insecticide and is the common name for N-(((3,5-dichloro-2-fluoro-4-(1,1,2,3,3,3-hexafluoro-propoxy)phenyl)amino)carbonyl)-2,6-difluorobenzamide. It is the active ingredient in several termiticide (termite insecticide) products registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. Noviflumuron was registered with the U.S. Environmental Protection Agency (EPA) as a reduced-risk pesticide. A reduced-risk pesticide is one the EPA believes has low impact on human health, low toxicity to non-target organisms, and low potential for groundwater contamination.

Noviflumuron is an odorless white solid that is formulated into low-concentration solid briquettes and other solid forms that are contained within tamper-resistant bait stations. Formulated noviflumuron contains 0.5% of the active ingredient, with the balance comprised almost entirely of cellulose and cellulose-based materials.

Noviflumuron formulations have been marketed under the trade names RECRUIT™ III Termite Bait, RECRUIT III AG Termite Bait, Recruit IV Termite Bait, RECRUIT IV AG Termite Bait, RECRUIT HD Termite Bait for use in the Sentricon™ Termite Colony Elimination System.

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Product Uses & Regulatory Information^{10,11}

Noviflumuron is used to control subterranean termite colonies. It is used in both 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. Noviflumuron products are used only by licensed pest management professionals. Noviflumuron is registered by the U.S. Environmental Protection Agency (EPA) for use as termite bait within the Sentricon™ *Termite Colony Elimination System*.

End-use termite bait formulations containing noviflumuron are registered and sold in Chile, Hong Kong, Japan, Taiwan, several Caribbean islands, 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 noviflumuron. 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^{3, 4,12}

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

- **Workplace exposure** – Exposure to the active ingredient could occur in facilities that manufacture or formulate noviflumuron. Those working with noviflumuron 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 noviflumuron** – Because noviflumuron is formulated in cellulose-based bait materials. (0.5% active ingredient), used within an enclosed station, and applied only by licensed pest management applicators, the potential for exposure to consumers and non-target organisms is virtually eliminated. Noviflumuron has a very low vapor pressure and this, along with the other physical and chemical properties of the bait and bait station, suggests that noviflumuron products should have minimal impact on indoor air. See [Health Information](#) and [Product Label](#).
- **Environmental releases** – Noviflumuron is slowly biodegradable in the soil and could be characterized as moderately persistent. It is very highly toxic to aquatic invertebrates and slightly toxic 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. Keep people away. Isolate the fire and deny unnecessary entry. Use a water spray or dry-chemical or carbon-dioxide extinguishers to fight the fire. Applying a forceful water stream to burning powdered material may form an explosive dust-air mixture. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Contain firewater runoff to minimize the potential for environmental damage. 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 [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 Information³

Laboratory testing – The active substance, noviflumuron, has been comprehensively evaluated under regulatory frameworks used for registration and approval of pesticide products in the U.S. and other countries (e.g., U.S. Federal Insecticides, Fungicides, Rodenticides Act). 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 noviflumuron 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. When used in accordance with label directions for the control of termites in and around structures, fence posts, utility poles, and landscape plantings, noviflumuron is not expected to pose a threat to human health.

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

Eye contact – Contact with solid or dust may cause slight, temporary irritation, although corneal injury is unlikely.

Skin contact – Brief contact is essentially nonirritating. Even 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 – Based on available data, repeated exposures are not anticipated to cause significant adverse effects.

Cancer information – This material has caused cancer in laboratory tests. However, the dose levels producing these effects were many times higher than any dose levels expected from exposure due to use.

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

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Environmental Information^{5,6}

The environmental fate data indicate that noviflumuron is strongly bound to soil and has very low water solubility, indicating a low potential for soil leaching. Noviflumuron is slowly biodegradable in the soil and could be characterized as moderately persistent.

Because noviflumuron is used at low dosages (0.5% active ingredient) in termite baits within enclosed stations, the likelihood of exposure to non-target terrestrial and aquatic wildlife species is extremely low. When used in accordance with label directions for the control of termites around structures, fence posts, utility poles, and landscape plantings, noviflumuron is not expected to pose a threat to non-target terrestrial and aquatic wildlife.

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

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Physical Hazard Information³

Noviflumuron formulations are stable under normal use and storage conditions. Keep out of the reach of children. Exposure to very high temperatures can cause this material to decompose. Good housekeeping and control of product dusts during manufacturing are necessary for the safe handling of this product. 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 Us (www.dowagro.com/company/contact/index.htm)
- RECRUIT™ IV AG Termite Bait Specimen Label, Dow AgroSciences LLC, Label code: D02-003-005, Revised September 28, 2010 (www.dowagro.com/products/label/index.htm)
- Sentricon™ Colony Elimination System, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004 (<http://www.cdms.net/manuf/mprod.asp?mp=11&lc=0&ms=3691&manuf=11>)
- Registration of RECRUIT III (EPA. Reg. No. 62719-453) and RECRUIT III AG (EPA Reg. No.62719-454) Containing the New Active Ingredient Noviflumuron, New York State Department of Environmental Conservation, February 11, 2004 (http://pmep.cce.cornell.edu/profiles/insect-mite/mevinphos-propargite/noviflumuron/recruit_reg_0204.pdf)
- Cabrera, B.J., and Thoms, E.M., "Versatility of Baits Containing Noviflumuron for Control of Structural Infestations of Formosan Subterranean Termites (Isoptera: Rhinotermitidae)," *Florida Entomologist*, 89(1), March 2006, pages 20–31 (<http://www.fcla.edu/FlaEnt/fe89p20.pdf>)
- 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>)

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

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References

- ¹ *Sentricon™ Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, page 2.
- ² *Sentricon Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, page 3.
- ³ *Noviflumuron (XDE-007) Technical Material Safety Data Sheet*, Dow AgroSciences LLC
- ⁴ *Public Report 2003-5 Noviflumuron: Tracking ID Numbers CRR-193920 through CCR-193923*, California Department of Pesticide Regulation, May 2003, page 6.
- ⁵ *Sentricon Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, page 9.
- ⁶ *Public Report 2003-5 Noviflumuron: Tracking ID Numbers CRR-193920 through CCR-193923*, California Department of Pesticide Regulation, May 2003, pages 3 and 5.
- ⁷ *Noviflumuron Briquette Material Safety Data Sheet*, Dow AgroSciences LLC, Product Code:67820
- ⁸ *Sentricon Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, pages 3–4 and 7.
- ⁹ *RECRUIT™ HD Bait Device Material Safety Data Sheet*, Dow AgroSciences LLC, November 2, 2009, pages 1 and 4.
- ¹⁰ *Public Report 2003-5 Noviflumuron: Tracking ID Numbers CRR-193920 through CCR-193923*, California Department of Pesticide Regulation, May 2003, page 1.
- ¹¹ *Sentricon Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, pages 2 and 4.
- ¹² *Sentricon Colony Elimination System*, Noviflumuron Technical Bulletin, Dow AgroSciences LLC, Form No. U01-028-146 (10/04) BOD October 2004, page 8.

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NOTICES

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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