Product Safety Assessment

*Tebuthiuron*

**Keywords**

CAS No: 34014-18-1  
Common Name: tebuthiuron  
Chemical Name: 1-(5-tert-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea (IUPAC)  
Spike™, Combine™, Bimate™, Graslan™, Perflan™, Molopo™, Savana™, Tebusan™, Herboc™,  
JC Herbic™, Herbiout™, Railroad™, Slam™.

Dow AgroSciences LLC  
The Dow Chemical Company  
Dow Chemical  
Dow

Product safety  
Environmental information  
Physical hazard information  
Product uses  
Health information
Product Safety Assessment

Tebuthiuron

Product Safety Assessment documents are available at www.dow.com/productsafety/finder/.

Select a Topic:
- Names
- Product Overview
- Manufacture of Product
- Product Description
- Product Uses & Regulatory Information
- Exposure Potential
- Health Information
- Environmental Information
- Physical Hazard Information
- Additional Information
- References

Names
- CAS No: 34014-18-1
- Tebuthiuron
- Tebuthiuron technical
- Chemical Name: 1-(5-tert-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea (IUPAC)
- Spike™
- Combine™
- Graslan™
- Perflan™
- Molopo™
- Savana™
- Tebusan™
- Herboc™
- JC Herbic™
- Herbiout™
- Railroad™
- Slam™

Product Overview

- Tebuthiuron is the common name for the active ingredient in COMBINE™ herbicide, PERFLAN™ herbicide, GRASLAN™ herbicide, SPIKE™ herbicide, MOLOPO™ herbicide, SAVANA™ herbicide, SLAM™ herbicide and TEBUSAN™ herbicide registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. For further details, see Product Description.
- Tebuthiuron is an odorless, white crystalline powder with a melting range of 159-161 °C and solubility of 2500 ppm in water. It is nonvolatile, stable in light, has good storage stability and is noncorrosive to application equipment. For further details, see Product Description.
- Tebuthiuron is used in the United States as a broad-spectrum herbicide for brush and weed control in rangeland to improve forage production and range condition. In countries such as Brazil, tebuthiuron is used in sugarcane to control a broad spectrum of weeds. In other countries such as Japan, Mexico, and South Africa, tebuthiuron-based products are used to control a broad spectrum of weeds in roadways, railways and parking areas. For further details, see the country-specific Product Label, Product Uses or Contact Us.
- Those working in manufacturing, packaging, or distribution operations could be exposed to tebuthiuron. Applicators may be exposed to tebuthiuron while spraying in the areas or crops where weeds are to be controlled. Workers using Tebuthiuron based products must wear...
proper protective equipment and follow label instructions carefully. For further details, see the country-specific Product Label, Product Uses or Contact Us.

- Tebuthiuron has a low order of toxicity in animals. In rat, the acute oral LD$_{50}$ was 579 mg/kg of bodyweight, respectively. No dermal irritation was observed and only slight transient eye irritation was observed in laboratory studies. In laboratory studies, Tebuthiuron is rapidly metabolized and excreted. Tebuthiuron has shown no evidence of carcinogenicity, mutagenicity or teratogenicity and did not affect reproduction performance in two multigeneration studies. For further details, see Health Information or the Safety Data Sheet.

- The toxicological effects of Tebuthiuron on aquatic and terrestrial animals occurred only at high concentrations and doses of the compound. Mammals, birds, and fish rapidly transform and excrete tebuthiuron and no accumulation occurs in animal tissues. A diet concentration of 100 ppm (equivalent to a dose of 7 mg/kg/day) of Tebuthiuron caused no effects in any mammalian study. No symptoms of toxicity occurred in chronic one-generation reproduction studies with bobwhites and mallards at a dietary concentration of 100 ppm. The spraying of honeybees with a 30,000 ppm solution of Tebuthiuron caused no greater mortalities than spraying bees with water. A Tebuthiuron concentration of 9.3 ppm in water caused no observed effects on any freshwater or saltwater animal.

- Laboratory and field monitoring studies have demonstrated that Tebuthiuron degrades in soil under a wide range of environments. The rate of degradation appears to be dependent on the amount of growing vegetation, temperature, rainfall, soil type and the edaphic variables. Calculated half-life values ranged between 11.1 and 17.7 months. In an extremely arid environment, the half-life was 60.8 months. For further details, see Environmental Information or Product Label.

- Tebuthiuron is nonvolatile, stable in light; stable under normal storage conditions, is non-explosive, non-flammable and is non-corrosive to application equipment. Consult the Product Label for specific use and storage information. For further details, see Physical Hazard Information.

**Manufacture of Product**

Tebuthiuron technical is manufactured using proprietary processes and materials. The chemical structure is shown below:

![Chemical Structure of Tebuthiuron](image_url)

**Product Description**

Tebuthiuron is the common name for the active ingredient in several commercial herbicide products registered to Dow AgroSciences LLC, a wholly-owned subsidiary of The Dow Chemical Company, and its global affiliates. Tebuthiuron is a broad-spectrum, thiadiazole urea herbicide for brush and weed control in rangeland being marketed and sold by Dow AgroSciences LLC, to improve forage production and range condition.
Tebuthiuron inhibits electron transport thus inhibiting the ability of plants to produce food and reducing the levels of nonstructural carbohydrates. In susceptible brush species the leaves become chlorotic after sufficient uptake of Tebuthiuron, followed by defoliation of the plant. Woody plants usually produce new leaves and then defoliate again, repeating this pattern several times until death occurs. As with other herbicidal photosynthetic inhibitors Tebuthiuron has been shown to inhibit RNA and lipid synthesis.

Tebuthiuron technical is a white to off-white solid. Tebuthiuron herbicide products are marketed as powder, granules and liquid. Formulations containing tebuthiuron are sold under a variety of trade names including Combine™, Bimate™, Perflan™, Graslan™, Spike™, Molopo™, Savana™, Slam™ and Tebusan™.

Product Uses and Regulatory Information

Tebuthiuron products are registered for use on a global basis. Examples of countries with registrations include Australia, Brazil, Japan, Mexico, South Africa, and the United States of America, among others.

Tebuthiuron is a broad-spectrum herbicide for brush and weed control in rangeland being marketed and sold by Dow AgroSciences LLC, to improve forage production and range condition. Others include its use in Sugarcane to control a broad spectrum of weeds, and in roadways, railways and parking areas to control a broad spectrum of weeds.

Tebuthiuron has been comprehensively evaluated under regulatory frameworks used for registration and approval of herbicides products in the United States and the other countries where it is marketed. These legal frameworks require both laboratory and field testing as per established by regulatory agencies to determine the potential for use to result in human health or environmental effects.

For further details, consult the country-specific Product Label, Safety Data Sheet, or Contact Us.

Exposure Potential

Tebuthiuron is used in the formulation of Spike™, Combine™, Graslan™, Perflan™, Molopo™, Savana™, Tebusan™, Herboc™, JC Herbic™, Herbiout™, Railroad™ and Slam™. Based on labeled uses, routes of potential exposure include:

- Workplace exposure – Pesticide handlers (mixers, loaders and applicators) may be exposed to Tebuthiuron during normal mixing and loading operations to mists during spray applications, and to dusts during application of solid formulations. This exposure is by inhalation and to the skin. Wearing proper protective equipment and following label instructions will reduce the potential for exposure. See Health Information and Product Label.

- Consumer exposure – Tolerances or maximum residue limits have been established where Tebuthiuron has been registered for use. The Environmental Protection Agency (EPA) concludes that there is a reasonable certainty that no harm will result to the general population.
and to infants and children from aggregate exposure to Tebuthiuron residues. See Health Information.

- **Environmental releases** – Consult the country-specific Safety Data Sheet or Product Label for more information about protective equipment and procedures. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Consult the country-specific Product Label and Safety Data Sheet for specific firefighting measures. 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, 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 commercial product package. For more information, see the Product Label or Safety Data Sheet.

**Health Information**

Health information for products containing tebuthiuron 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. These products may also contain minor components or additives that have additional health risks. An overview of health information for Tebuthiuron technical appears below.

**Laboratory testing** – Tebuthiuron has been evaluated by comprehensive regulatory guidelines and registered and approved for sale and use in the United States and other countries. These guidelines require laboratory testing for potential short-term (acute) and long-term (chronic) health effects. These tests help scientists determine how chemicals might affect humans, domestic animals, or wildlife in cases of exposure. Pesticide products used according to label directions are unlikely to cause toxic effects. Health information for formulated Tebuthiuron products is summarized in country-specific Safety Data Sheets. These are a preferred source for specific health information as product formulations may contain components or additives. For further details, also consult the country-specific Product Label.

**Eye contact** – May cause slight temporary eye irritation. Corneal injury is unlikely.

**Skin contact** – Prolonged contact is essentially nonirritating to skin.

**Inhalation** – Prolonged excessive exposure to duct may cause adverse effects.

**Ingestion** – Single dose oral toxicity of Tebuthiuron based products is moderate. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death.

**Repeated exposure** – In animal, effects have been reported in the following organs: pancreas. Tebuthiuron has shown no evidence of carcinogenicity or mutagenicity.

**Developmental and/or reproductive effects** – Tebuthiuron did not cause birth defects or other effects in the fetus even at doses which caused toxic effects in the mother. In animal studies, Tebuthiuron did not interfere with reproduction performance in two multi-generation studies.
**Systemic effects** – For more information, see the [Product Label](#) or [Safety Data Sheet](#).

**Environmental information**

Tebuthiuron is metabolized in soil-by-soil microorganisms. The major metabolic pathway for microbial degradation is demethylation. Laboratory and field monitoring studies have demonstrated that Tebuthiuron degrades in soil under a wide range of environments. The rate of degradation appears to be dependent on the amount of growing vegetation, temperature, rainfall, soil type and the edaphic variables. Laboratory and field studies have demonstrated that Tebuthiuron has a moderate degree of mobility in soil. Monitoring of soil residues in numerous studies up to three years after application under a range of environments has found soil residues confined to the top 24 inches of soil. Accumulation of Tebuthiuron in soil is unlikely and residues in soil should not have an adverse impact on the environment.

Toxicity and safety studies were conducted with Tebuthiuron in representative aquatic and terrestrial wildlife species to assess potential hazards to nontarget organisms. The toxicological effects of Tebuthiuron on aquatic and terrestrial animals occurred only at high concentrations of the compound. Mammals, birds, and fish rapidly transform and excrete Tebuthiuron and no accumulation occurs in animal tissues. Tebuthiuron is practically nontoxic on an acute basis to birds, beneficial insects, fish, and aquatic invertebrates, but is slightly toxic to mammals. Tebuthiuron may be toxic to some terrestrial and aquatic non-target plants. The spraying of honeybees with a 30,000 ppm solution of Tebuthiuron caused no greater mortalities than spraying bees with water. A Tebuthiuron concentration of 9.3 ppm in water caused no observed effects on any freshwater or saltwater animal.

The acute toxicity of Tebuthiuron was tested in studies with *Daphnia magna*, eastern oyster, pink shrimp, fiddler crab, bluegill and rainbow trout. The LC$_{50}$ or EC$_{50}$ ranged from 48 ppm to 320 ppm for these organisms. The chronic toxicity of tebuthiuron was assessed in fathead minnow and rainbow trout embryolarval studies. Tebuthiuron concentration of 9.3 ppm caused no observed effects on any freshwater or saltwater animal in these studies. A Tebuthiuron concentration of 9.3 ppm is more than 50 times the maximum environmental concentration observed. Thus, Tebuthiuron has a low order of toxicity to aquatic and terrestrial wildlife and when used appropriately, Tebuthiuron is not believed to present a hazard to aquatic animals.

Based on all available data, when used appropriately, Tebuthiuron should not result in an adverse impact on the environment and the risks to associated aquatic and terrestrial wildlife are minimal and within acceptable limits.

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

**Physical hazard information**

Tebuthiuron is nonvolatile, stable in light; stable under normal storage conditions, is non-explosive, non-flammable and is non-corrosive to application equipment. Consult the [Product Label](#) for specific use and storage information.

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

- Safety Data Sheets and Product Labels (http://www.dowagro.com/products/label/index.htm)
- Contact Us (http://www.dowagro.com/company/contact/index.htm)
- Dow AgroSciences Product website: USA: http://www.dowagro.com/usag/prod/

References

- EPA R.E.D Facts Tebuthiuron. April 1994
- Dow AgroSciences. Tebuthiuron Technical. Material Safety Data Sheet
- Dow AgroSciences. Spike 80 DF. Material Safety Data Sheet
- Dow AgroSciences. Spike 20 P. Material Safety Data Sheet

For more business information about Tebuthiuron visit the Dow AgroSciences website at http://www.dowagro.com/.

Back to top

“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.

The information herein is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Dow be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information herein or the product to which that information refers.

Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent and Dow makes no representation or warranty, express or implied that the use thereof will not infringe any patent.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Dow makes no commitment to update or correct any information that appears on the Internet or on its World-Wide Web server. The information contained in this document is supplemental to the Internet Disclaimer, http://www.dow.com/homepage/disclosure.html.”

Back to top

Form No. 233-01133-MM-0814

®Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

Created: August 14, 2014 The Dow Chemical Company Page 7 of 7