Product Safety Assessment
VERSENOL™ AG Fe Chelate

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Names
- VERSENOL™ AG Fe chelate
- VERSENOL ferric HEDTA chelate

Product Overview
- VERSENOL™ AG Fe chelate is a dark red to brown liquid with a slight odor. The active ingredient in this water-based product is ferric hydroxyethylethylenediaminetriacetate.¹ For further details, see Product Description.
- VERSENOL AG Fe chelate is primarily used in agricultural applications as a micronutrient and as an herbicide.² For further details, see Product Uses.
- Exposure to VERSENOL AG Fe chelate can occur either in facilities that manufacture this product or in the agricultural facilities that use it. Agricultural workers could be exposed during application. Dow does not sell this product for consumer use, so direct consumer contact is unlikely.³ For further details, see Exposure Potential.
- Eye contact may cause slight irritation and pain disproportionate to the level of irritation. Prolonged skin contact may cause irritation with local redness. Swallowing may result in gastrointestinal irritation. Because this product contains sodium nitrate, it may cause methemoglobinemia, impairing the ability of the blood to transport oxygen. Although large dietary doses of NTA (a minor component) have caused urinary tumors in laboratory animals, there is little likelihood that NTA could cause cancer in humans, especially at subtoxic doses.⁴ For further details, see Health Information.
- VERSENOL AG Fe chelate is degradable, unlikely to accumulate in the food chain (bioconcentration potential is low), and practically nontoxic to aquatic organisms on an acute basis.⁵ For further details, see Environmental Information.
- VERSENOL AG Fe chelate is stable at recommended storage and normal use temperatures but can decompose at elevated temperatures. Avoid contact with cyanides, oxidizers, reducing agents, cellulosic absorbents, or sawdust. Hydrogen may be generated from contact with aluminum.⁶ For further details, see Physical Hazard Information.
Manufacture of Product

- **Location** – The Dow Chemical Company and its foreign affiliates manufacture ferric hydroxyethylethlenediaminetriacetate, the active ingredient in VERSENOL™ AG Fe chelate, at facilities in Freeport, Texas, USA.
- **Process** – Ferric hydroxyethylethlenediaminetriacetate (HEDTA) is manufactured by the carboxymethylation of aminoethylethanolamine and iron salt. The structure for HEDTA is shown below:

\[
\text{HOCH}_2\text{CH}_2\text{NCH}_2\text{CH}_2\text{NCH}_2\text{CH}_2\text{COOH} \quad \text{CH}_2\text{COOH} \\
\text{HOOCCH}_2\text{NCH}_2\text{CH}_2\text{NCH}_2\text{CH}_2\text{COOH} \quad \text{Fe}^{3+}
\]

The structure for ferric hydroxyethylethlenediaminetriacetate is shown below.

Product Description

VERSENOL™ AG Fe chelate is a dark red to brown liquid with a slight odor. The active ingredient in this water-based product is ferric hydroxyethylethlenediaminetriacetate, which is present at 25%. The product also contains 16% sodium nitrate (CAS No. 7631-99-4) and several minor components. The balance (55.5%) is water.

Product Uses

VERSENOL™ AG Fe chelate is primarily used in agricultural applications as a micronutrient and an herbicide.

Exposure Potential

VERSENOL™ AG Fe chelate is used in agricultural crop production. Based on the uses for this product, individuals could be exposed through:

- **Workplace exposure** – Exposure can occur either in facilities that manufacture VERSENOL AG Fe chelate or in the various agricultural facilities that use it. It is produced, distributed, and stored in closed systems. Those working with VERSENOL AG Fe chelate in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Agricultural workers could be exposed during application. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to products containing VERSENOL AG Fe chelate** – Dow does not sell this product for consumer use, so direct consumer contact is unlikely. VERSENOL AG Fe chelate is not considered a risk to consumers. See Health Information.

- **Environmental releases** – VERSENOL AG Fe chelate may be released into the environment during use. Due to its high water solubility, the compound will partition to water. Biodegradation and photodegradation in the environment are expected. In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface water, or groundwater. Small spills should be absorbed with sand or soil. See Environmental, Health, and Physical Hazard Information.
• **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, VERSENOL AG Fe chelate should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. An approved positive-pressure, self-contained breathing apparatus (SCBA) with a full-face mask is recommended for emergency work. See Environmental, Health, and Physical Hazard Information.

• **In case of fire** – This product will not burn until evaporated to dryness. The residue is combustible. Isolate the fire and deny unnecessary entry into the area. Keep people away. Use water fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the 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.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

**Health Information**

**Eye contact** – Contact may cause slight eye irritation and pain disproportionate to the level of irritation to tissues. Corneal injury is unlikely.

**Skin contact** – Prolonged contact may cause skin irritation with local redness. A more severe response may result if the skin is abraded. Prolonged contact is unlikely to result in absorption of harmful amounts.

**Inhalation** – Vapors are primarily water; a single exposure is not likely to be hazardous.

**Ingestion** – Low toxicity if swallowed. Small amounts swallowed incidental to normal handling are not likely to cause injury, however, swallowing larger amounts may cause injury. Because this product contains sodium nitrate, it may cause methemoglobinemia, impairing the ability of the blood to transport oxygen. Swallowing may also result in gastrointestinal irritation.

**Repeated exposure** – In humans, symptoms may include central nervous system depression, headache, drowsiness, loss of coordination, or low blood pressure based on the sodium nitrate. Repeated excessive exposures may alter concentrations of metals in the body. Some components have been shown in animal testing to cause deposition of calcium salts in various urinary tract tissues.

**Genetic** – Most data indicate that EDTA and its salts are not mutagenic. Reported minimal effects are likely due to trace metal deficiencies resulting from chelating by EDTA.

**Other** – Although large dietary doses of NTA (a minor component) have caused urinary tumors in laboratory animals, there is little likelihood that NTA could cause cancer in humans, especially at sub-toxic doses. NTA is listed in group 2B (possibly carcinogenic to humans) according to the International Agency for Research on Cancer (IARC).

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

**Environmental Information**

VERSENOL™ AG Fe chelate is water soluble and nonvolatile. If released to the environment, the active compound will tend to remain in water with minimal tendency to bind to soil or sediment. It is unlikely to persist in the environment. It is susceptible to both biodegradation and photodegradation, which suggests that it will be removed from water and soil environments.
VERSENOL™ AG Fe chelate is not likely to accumulate in the food chain (bioconcentration potential is low) and is practically nontoxic to aquatic organisms on an acute basis (LC$_{50}$/EC$_{50}$ >100 mg/L in the most sensitive species tested).

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information

VERSENOL™ AG Fe chelate is stable at recommended storage and normal use temperatures but can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure build-up in closed systems. Avoid contact with cyanides, oxidizers, reducing agents, cellulosic absorbents, or sawdust. Hydrogen may be generated from contact with aluminum.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of VERSENOL™ AG Fe chelate. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Data Sheet, or Contact Us.

Additional Information

- Request the Safety Data Sheet from the Dow Customer Information Group
- Contact Us (www.dow.com/VERSENE/contact/)
- VERSENOL™ AG Fe Chelate Fully Chelated Micronutrient Technical Data Sheet, The Dow Chemical Company, Form No. 113-01361, October 2005 (www.dow.com/versene/products/specialty.htm)
- Selecting the Correct DOW™ Chelating Agent, The Dow Chemical Company, Form No. 113-01361-1201AMS, December 2001 (www.dow.com/versene/resources/literature.htm)

For more business information about VERSENOL™ AG Fe chelate, visit the Dow VERSENE™ Chelating Agents web site and www.dow.com/versene/applications/agriculture.htm.

References


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