



Material Safety Data Sheet

The Dow Chemical Company

Product Name: NORKOOL(TM) Inhibitor 244

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The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name
NORKOOL(TM) Inhibitor 244

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number: 800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: 989-636-4400
Local Emergency Contact: 989-636-4400

2. Hazards Identification

Emergency Overview

Color: Yellow

Physical State: Liquid

Odor: Characteristic

Hazards of product:

DANGER! Causes severe eye burns. Causes burns of the mouth and throat. Causes respiratory tract irritation. Harmful if swallowed. May cause skin irritation. Aspiration hazard. Can enter lungs and cause damage. Evacuate area. Keep upwind of spill. Highly toxic to fish and/or other aquatic organisms.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Skin Contact: Prolonged contact may cause moderate skin irritation with local redness.

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Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation: Excessive exposure may cause severe irritation to upper respiratory tract (nose and throat) and lungs.

Ingestion: Moderate toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. Swallowing may result in gastrointestinal irritation or ulceration. Swallowing may result in burns of the mouth and throat. May cause nausea and vomiting. May cause abdominal discomfort or diarrhea. May cause methemoglobinemia, thereby impairing the blood's ability to transport oxygen.

Aspiration hazard: Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Effects of Repeated Exposure: For the component(s) tested: In animals, effects have been reported on the following organs: Heart. Liver. Spleen. Gastrointestinal tract. Testes. May cause methemoglobinemia, thereby impairing the blood's ability to transport oxygen.

Cancer Information: Sodium nitrite has produced tumors in laboratory animals only at high doses; low dietary doses did not cause cancer in laboratory animals. It has caused tumors in animals when given in combination with secondary amines or disulfiram (for treatment of alcoholism). Persons on disulfiram (ANTABUSE) therapy with possible exposure to nitrites should seek medical advice.

Birth Defects/Developmental Effects: Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother. Animal ingestion studies in several species, at high doses, indicate that borates cause developmental effects.

Reproductive Effects: Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive effects. A human study of occupational exposure to borate dust showed no adverse effects on reproduction.

3. Composition Information

Component	CAS #	Amount
Water	7732-18-5	> 75.0 %
Sodium nitrite	7632-00-0	< 15.0 %
Sodium tetraborate pentahydrate	12179-04-3	< 10.0 %
Sodium tolyltriazole	64665-57-2	< 5.0 %

4. First-aid measures

Eye Contact: Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist.

Skin Contact: Wash skin with plenty of water.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Ingestion: Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth to an unconscious person.

Notes to Physician: Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. Maintain adequate ventilation and oxygenation of the patient. Administer 100% oxygen to relieve headache and a general sense of weakness. Determine methemoglobin concentration of blood every 3 to 6 hours for first 24 hours. It should return to normal within 24 hours. The treatment of toxic methemoglobinemia may include the intravenous administration of methylene blue. If methemoglobin >10-20% consider methylene blue 1-2 mg/kg body weight as 1% solution intravenously over 5 minutes followed by 15-30 cc flush (Price D, Methemoglobinemia, Goldfrank Toxicologic Emergencies, 5th ed., 1994). Also provide 100% oxygen. May cause asthma-like (reactive airways) symptoms. Bronchodilators, expectorants, antitussives and corticosteroids may be of help. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may

cause lung injury. Suggest endotracheal/esophageal control if lavage is done. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Medical Conditions Aggravated by Exposure: Methemoglobinemia may aggravate any preexisting condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemia.

5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.

Hazardous Combustion Products: Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Nitrogen oxides. Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Absorb with materials such as: Cat litter. Sawdust. Vermiculite. Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Evacuate area. Only trained and properly protected personnel must be involved in clean-up operations. Keep upwind of spill. Ventilate area of leak or spill. Refer to Section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

7. Handling and Storage

Handling

General Handling: Do not get in eyes. Avoid breathing vapor. Do not swallow. Avoid contact with skin and clothing. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Do not store in: Opened or unlabeled containers. Galvanized steel. Store in the following material(s): Carbon steel. Stainless steel. Store in original unopened container. See Section 10 for more specific information. Additional storage and handling information on this product may be obtained by calling your Dow sales or customer service contact.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Sodium tetraborate pentahydrate	ACGIH	TWA Inhalable fraction.	2 mg/m ³
	ACGIH	STEL Inhalable fraction.	6 mg/m ³

Personal Protection

Eye/Face Protection: Use chemical goggles. Eye wash fountain should be located in immediate work area.

Skin Protection: Wear clean, body-covering clothing.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Nitrile/butadiene rubber ("nitrile" or "NBR"). Neoprene. Polyvinyl chloride ("PVC" or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. The following should be effective types of air-purifying respirators: Organic vapor cartridge.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Physical State	Liquid
Color	Yellow
Odor	Characteristic
Flash Point - Closed Cup	<i>Pensky-Martens Closed Cup ASTM D 93 None</i>
Flammable Limits In Air	Lower: <i>Not determined, aqueous system.</i> Upper: <i>Not determined, aqueous system.</i>
Autoignition Temperature	Not determined
Vapor Pressure	14.8 mmHg <i>Literature</i>
Boiling Point (760 mmHg)	104 °C (219 °F) <i>Literature</i> .
Vapor Density (air = 1)	0.7 <i>Literature</i>
Specific Gravity (H ₂ O = 1)	1.172 20 °C/20 °C <i>Literature</i>
Freezing Point	-12 °C (10 °F) <i>Literature</i>
Melting Point	Not applicable to liquids
Solubility in Water (by weight)	100 % @ 20 °C <i>Literature</i>

pH	11.7 Literature
Decomposition	No test data available
Temperature	
Kinematic Viscosity	Not applicable

10. Stability and Reactivity

Stability/Instability

Thermally stable at typical use temperatures.

Conditions to Avoid: Some components of this product can decompose at elevated temperatures.

Incompatible Materials: Avoid contact with: Strong acids.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide.

Nitrogen oxides.

11. Toxicological Information

Acute Toxicity

Ingestion

Single dose oral LD50 has not been determined.

Skin Absorption

The dermal LD50 has not been determined.

Repeated Dose Toxicity

For the component(s) tested: In animals, effects have been reported on the following organs: Heart. Liver. Spleen. Gastrointestinal tract. Testes. May cause methemoglobinemia, thereby impairing the blood's ability to transport oxygen.

Chronic Toxicity and Carcinogenicity

Sodium nitrite has produced tumors in laboratory animals only at high doses; low dietary doses did not cause cancer in laboratory animals. It has caused tumors in animals when given in combination with secondary amines or disulfiram (for treatment of alcoholism). Persons on disulfiram (ANTABUSE) therapy with possible exposure to nitrites should seek medical advice.

Developmental Toxicity

Contains component(s) which, in laboratory animals, have been toxic to the fetus only at doses toxic to the mother. Animal ingestion studies in several species, at high doses, indicate that borates cause developmental effects. Contains component(s) which did not cause birth defects in laboratory animals.

Reproductive Toxicity

Animal ingestion studies in several species, at high doses, indicate that borates cause reproductive effects. A human study of occupational exposure to borate dust showed no adverse effects on reproduction.

Genetic Toxicology

Contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others. Contains component(s) which were negative in animal genetic toxicity studies.

12. Ecological Information

ENVIRONMENTAL FATE

Data for Component: **Sodium nitrite****Movement & Partitioning**

- || Bioconcentration potential is low (BCF less than 100 or log Pow less than 3).
- || **Partition coefficient, n-octanol/water (log Pow):** -3.7 Measured

Persistence and Degradability

- || **Theoretical Oxygen Demand:** 0.23 mg/mg

Data for Component: **Sodium tetraborate pentahydrate****Movement & Partitioning**

- || No bioconcentration is expected because of the relatively high water solubility.

Persistence and Degradability

- || Material is expected to be readily biodegradable.

ECOTOXICITY

Data for Component: **Sodium nitrite**

- || Material is highly toxic to aquatic organisms on an acute basis (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity

- || LC50, rainbow trout (*Oncorhynchus mykiss*), flow-through, 96 h: 0.19 - 0.39 mg/l

Aquatic Invertebrate Acute Toxicity

- || EC50, water flea *Daphnia magna*, 24 h, immobilization: 130 mg/l

Data for Component: **Sodium tetraborate pentahydrate**

- || Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity

- || LC50, dab (*Limanda limanda*), 96 h: 74 mg/l

Aquatic Invertebrate Acute Toxicity

- || EC50, water flea *Daphnia magna*, 24 h: 242 mg/l

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Technical Name: CONTAINS SODIUM NITRITE

Hazard Class: 9 **ID Number:** UN3082 **Packing Group:** PG III

IMDG**Proper Shipping Name:** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S**Technical Name:** CONTAINS SODIUM NITRITE**Hazard Class:** 9 **ID Number:** UN3082 **Packing Group:** PG III**EMS Number:** F-A,S-F**Marine pollutant.:** Yes**ICAO/IATA**

NOT REGULATED

Additional Information

Reportable quantity: 833 lb – SODIUM NITRITE

MARINE POLLUTANT

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	Yes
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Component	CAS #	Amount
Sodium nitrite	7632-00-0	< 15.0 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Sodium nitrite	7632-00-0	< 15.0 %
Sodium tetraborate pentahydrate	12179-04-3	< 10.0 %

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	3	0	0

Recommended Uses and Restrictions

Corrosion inhibitor. For industrial use only. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

Revision

Identification Number: 1361 / 1001 / Issue Date 08/27/2008 / Version: 2.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.