Bayer CropScience

MATERIAL SAFETY DATA SHEET

BAYER CROPSCIENCE LP
P.O. Box 12014
2 T.W. Alexander Drive
Research Triangle Park, NC 27709

For Medical and Transportation Emergencies Only:
Call 24 hours a day 1-800-7577
For Product Use Information: Call 1-866-99BAYER (1-866-992-2937)

1. CHEMICAL PRODUCT IDENTIFICATION:

PRODUCT NAME.....: DI-SYSTON 15% Granular Systemic Insecticide
PRODUCT CODE.....: 11051
CHEMICAL FAMILY.....: Organophosphorous Insecticide
CHEMICAL NAME.....: O,O-Diethyl S-(2-(ethylthio)ethyl) phosphorodithioate
SYNONYMS.....: Disulfoton
FORMULA.....: C8 H19 02 P S3
EPA Registration No.: 264-723

2. COMPOSITION/INFORMATION ON INGREDIENTS:

INGREDIENT NAME /CAS NUMBER	EXPOSURE LIMITS	CONCENTRATION (%)
***** HAZARDOUS INGREDIENTS *****		
DI-SYSTON (disulfoton)		
298-04-4	OSHA : .10 mg/m3 TWA (Skin) ACGIH: .10 mg/m3 TWA	15 %
Ingredient 1422		
Specific chemical identity is withheld as a trade secret.	OSHA : Not Established ACGIH: Not Established	1-3 %
Ingredient 1476 may be used as an alternate to Ingredient 1422.		
Total crystalline silica (quartz)		
14808-60-7	OSHA : .10 mg/m3 TWA (respirable) ACGIH: .10 mg/m3 TWA (respirable)	0-9 %

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3. HAZARDS IDENTIFICATION:

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* EMERGENCY OVERVIEW *
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* DANGER! Toxic; Color: Gray, tan or reddish; Form: Solid; *
* Granules; Odor: Organosulfur compounds; Organophosphate *
* Insecticide - Cholinesterase Inhibitor; Harmful if inhaled; *
* Harmful if absorbed through skin; Harmful if swallowed. *
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POTENTIAL HEALTH EFFECTS:

ROUTE(S) OF ENTRY.....: Inhalation; Skin Contact; Skin Absorption; Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE:

ACUTE EFFECTS OF EXPOSURE.....: This material is highly toxic by the oral route of exposure and is readily absorbed through the mucous membrane of the eye. Inhalation, dermal absorption or ingestion of this material may result in systemic intoxication due to inhibition of the enzyme cholinesterase. The sequence of development of systemic effects varies with the route of entry, and the onset of symptoms may be delayed up to 12 hours. First symptoms of poisoning may be nausea, increased salivation, lacrimation, blurred vision and constricted pupils. Other symptoms of systemic poisoning include vomiting, diarrhea, abdominal cramping, dizziness and sweating. After inhalation, respiratory symptoms like tightness of chest, wheezing, and laryngeal spasms, may be pronounced at first. If the poisoning is severe, then symptoms of convulsions, low blood pressure, cardiac irregularities, loss of reflexes and coma may occur. In extreme cases, death may occur due to a combination of factors such as respiratory arrest, paralysis of respiratory muscles or intense bronchoconstrictions. Complete symptomatic recovery from sublethal poisoning usually occurs within one week once the source of exposure is completely removed. See Section 11 for additional information.

CHRONIC EFFECTS OF EXPOSURE...: Cholinesterase inhibition sometimes persists for 2-6 weeks, thus repeated exposure to small amount of this material may result in an unexpected cholinesterase depression causing symptoms such as malaise, weakness, and anorexia that resemble other illnesses such as influenza. Exposure to a concentration that would not have produced symptoms in a person that was not previously exposed may produce severe symptoms of cholinesterase inhibition in a previously exposed person. In addition, this material may contain an amount of total crystalline silica (quartz) which ranges from approximately 0 - 9%. However, the amount of respirable crystalline silica is expected to be significantly lower based on data provided by the raw material manufacturer. Excessive long-term exposure to respirable crystalline silica may cause silicosis, a form of disabling, progressive pulmonary fibrosis. Severe and permanent lung damage may result.

3. HAZARDS IDENTIFICATION (Continued)

CARCINOGENICITY.....: This product is not listed as a carcinogen by NTP or IARC, or regulated as a carcinogen by OSHA. However, it may contain crystalline silica (quartz), a substance which is classified by NTP as a Group 2 carcinogen and by IARC as a Group I carcinogen. Crystalline silica is a naturally-occurring mineral component of many sands and clays. Although controversial, the carcinogenic potential of crystalline silica must be considered if it is inhaled under excessive exposure conditions. However, the respirable portion of the silica which may be contained in this product is small, such that excessive inhalation exposure during normal conditions of use is unlikely.

NTP.....: Crystalline silica is classified as an NTP Anticipated Human Carcinogen - "Substances or groups of substances that may reasonably be anticipated to be carcinogens."

IARC.....: IARC has classified crystalline silica as a Group 1 carcinogen. "There is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica (quartz) from occupational sources."

OSHA.....: Not regulated

MEDICAL CONDITIONS

AGGRAVATED BY EXPOSURE.....: No specific medical conditions are known which may be aggravated by exposure to the active ingredient in this product. However, any disease, medication or prior exposure which reduces normal cholinesterase activity may increase susceptibility to the toxic effects of the active ingredient. In addition, pulmonary and respiratory diseases may be aggravated by exposure to respirable crystalline silica.

4. FIRST AID MEASURES:

FIRST AID FOR EYES.....: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

FIRST AID FOR SKIN.....: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

FIRST AID FOR INHALATION: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment information.

FIRST AID FOR INGESTION.: Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by physician or poison control center. Do not give anything by mouth to an unconscious person.

4. FIRST AID MEASURES (Continued)

NOTE TO PHYSICIAN.....: This product contains the organophosphorus insecticide disulfoton, a cholinesterase inhibitor. Cholinesterase inhibition results in stimulation of the central nervous system, the parasympathetic nervous system and the somatic motor nerves. If symptoms of organophosphate poisoning are present, the administration of atropine sulfate is indicated. Administer atropine sulfate in large, therapeutic doses. In mild cases, start treatment by giving 1-2 mg of atropine intravenously every 15 minutes until signs of atropinization appear (dry mouth, flushing, and dilated pupils if pupils were originally pinpoint). In severe cases, start treatment by giving 2-4 mg intravenously every 5-10 minutes until fully atropinized. Dosages for children should be appropriately reduced. 2-PAM is also antidotal and may be used in conjunction with atropine. Do not give morphine. Watch for pulmonary edema which may develop in serious cases of poisoning even after 24 hours. At first sign of pulmonary edema, place patient in oxygen tent and treat symptomatically.

5. FIRE FIGHTING MEASURES:

FLASH POINT.....: Not applicable
FLAMMABLE LIMITS:
UPPER EXPLOSIVE LIMIT (UEL)(%): Not applicable
LOWER EXPLOSIVE LIMIT (LEL)(%): Not applicable
EXTINGUISHING MEDIA.....: Water; Carbon Dioxide; Dry Chemical; Foam
SPECIAL FIRE FIGHTING PROCEDURES: Keep out of smoke; cool exposed containers with water spray. Fight fire from upwind position. Use self-contained breathing equipment. Contain runoff by diking to prevent entry into sewers or waterways. Equipment or materials involved in pesticide fires may become contaminated.

6. ACCIDENTAL RELEASE MEASURES:

SPILL OR LEAK PROCEDURES.....: Isolate area and keep unauthorized people away. Do not walk through spilled material. Avoid breathing dusts and skin contact. Avoid generating dust (a fine water spray mist, plastic film cover, or floor sweeping compound may be used if necessary). Wear proper protective equipment. Carefully sweep up spilled material. Place in covered container for reuse or disposal. Scrub contaminated area with detergent and bleach solution. Repeat. Rinse with water. Use dry absorbent material such as clay granules to absorb and collect wash solution for proper disposal. Contaminated soil may have to be removed and disposed. Do not allow material to enter streams, sewers, or other waterways or contact vegetation.

7. HANDLING AND STORAGE:

STORAGE TEMPERATURE(MIN/MAX): 0 F/ 30-day average not to exceed 100 F
SHELF LIFE.....: Time/temperature-dependent. Contact Bayer for additional information.
SPECIAL SENSITIVITY.....: Heat, Moisture
HANDLING/STORAGE PRECAUTIONS: Store in a cool dry area designated specifically for pesticides. Do not store near any material intended for use or consumption by humans or animals.

8. PERSONAL PROTECTION:

EYE PROTECTION REQUIREMENTS.....: Goggles should be used to prevent dust from getting into the eyes.
SKIN PROTECTION REQUIREMENTS.....: Avoid skin contact. Use chemical-resistant gloves (such as nitrile or butyl rubber), boots or shoe covers, and apron to prevent dermal exposure.
VENTILATION REQUIREMENTS.....: Maintain exposure levels below exposure limits through use of general and local exhaust ventilation.
RESPIRATOR REQUIREMENTS.....: If needed, based on the conditions of use, wear a NIOSH-approved organic vapor respirator with particulate pre-filter.
MEDICAL SURVEILLANCE.....: Plasma and/or red blood cell cholinesterase activity can be used to detect excessive absorption of disulfoton. It is preferable to establish a pre-exposure baseline value for best comparisons. Contact Bayer for additional information. If significant cholinesterase depression occurs, no further exposure should be allowed until cholinesterase values return to normal.
ADDITIONAL PROTECTIVE MEASURES.....: Clean water should be available for washing in case of eye or skin contamination. Educate and train employees in safe use of the product. Follow all label instructions. Launder clothing separately after use. Wash thoroughly after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES:

PHYSICAL FORM.....: Solid; Granules
COLOR.....: Gray, tan or reddish
ODOR.....: Organosulfur compounds
ODOR THRESHOLD.....: Not established
MOLECULAR WEIGHT.....: 274.4 (for disulfoton)
pH .....: Not established
BOILING POINT.....: Not applicable
MELTING/FREEZING POINT....: Not applicable
SOLUBILITY IN WATER .....: 12 ppm (for disulfoton)

9. PHYSICAL AND CHEMICAL PROPERTIES (Continued)

SPECIFIC GRAVITY .....: Not applicable
BULK DENSITY.....: 43-52 pounds/ft. cu.
% VOLATILE BY VOLUME.....: Not established
VAPOR PRESSURE .....: 1.7 X 10-5 mm Hg @ 20 C (for disulfoton)
VAPOR DENSITY .....: Not applicable (Air = 1)

10. STABILITY AND REACTIVITY:

STABILITY.....: This is a stable material.
HAZARDOUS POLYMERIZATION...: Will not occur.
INCOMPATIBILITIES.....: Strong oxidizing agents and bases
INSTABILITY CONDITIONS.....: Sustained temperatures above 100 F
DECOMPOSITION PRODUCTS.....: Proposed compounds due to fire or other extreme conditions: SO2, H3PO4, CO, C2H5SH, diethyl disulfide

11. TOXICOLOGICAL INFORMATION:

Only acute studies have been performed on this product as formulated. The non-acute information pertains to the active ingredient, disulfoton.

ACUTE TOXICITY
ORAL LD50.....: Male rats: 52 mg/kg -- Female rats: 14 mg/kg
DERMAL LD50.....: Male rabbit: approx. 1000 mg/kg -- Female rabbit: > 1000 mg/kg
EYE EFFECTS.....: Rabbit: Not an eye irritant, however, this product is highly toxic and can be readily absorbed through the mucous membranes of the eye.
SKIN EFFECTS.....: Rabbit: Not a dermal irritant
SENSITIZATION.....: Dermal sensitization studies have not been performed on this formulation; however, the active ingredient, disulfoton, is not a dermal sensitizer.
SUBCHRONIC TOXICITY...: In a 13 week inhalation study, rats were exposed to disulfoton for 6 hours/day, 5 days/week at mean analytical concentrations of 0.018, 0.16 or 1.4 mg/m3. At the highest concentration, compound-related effects included cholinesterase inhibition and an increased incidence of inflammation of the nasal turbinates. The no-observed-effect-level (NOEL) was 0.16 mg/m3. In dermal toxicity studies, disulfoton was administered to the back of rabbits for 6 hours/day, 5 days/week for 3 weeks at levels ranging from 0.4 up to 6.5 mg/kg. Cholinergic symptoms including muscle spasms, tremors, salivation, and difficult breathing were observed in rabbits at 3.0 mg/kg and greater. Mortality also occurred at these levels. The NOEL for these studies was 0.8 mg/kg based on cholinesterase inhibition.
CHRONIC TOXICITY.....: In a 1 year study, dogs were administered disulfoton at dietary concentrations of 0.5, 4 or 12 ppm. The only significant effects observed in the study were the inhibition of cholinesterase activities. The

NOEL was 0.5 ppm on the basis of cholinesterase inhibition. Disulfoton was administered to rats at dietary concentrations of 1, 4 or 16 ppm for 2 years. Effects observed at the high dose included decreased food consumption, decreased body weight gain, cholinesterase inhibition, eye effects and increased mortality. The NOEL for systemic effects was 4 ppm. In a subsequent 6 month study in which rats were administered disulfoton at dietary concentrations of 0.25, 0.5 or 1.0 ppm, the overall NOEL for cholinesterase inhibition was 0.5 ppm.

CARCINOGENICITY.....: Disulfoton was investigated for carcinogenicity in chronic feeding studies using rats and mice. There was no evidence of a carcinogenic effect in either species at dose levels up to and including 16 ppm, the highest dose tested.

MUTAGENICITY.....: A number of mutagenicity studies have been conducted on disulfoton. Three in vitro studies showed disulfoton to be a potential mutagen, however, these results were not substantiated in in vivo testing.

DEVELOPMENTAL TOXICITY: In a rat teratology study, disulfoton was administered during gestation at oral doses of 0.1, 0.3 or 1.0 mg/kg/day. Maternal cholinesterase inhibition occurred at 0.3 mg/kg and greater. At the maternally toxic dose of 1.0 mg/kg, there was an increased incidence of incomplete ossification of the sternebrae in fetuses. The NOELs for maternal and developmental toxicity were 0.1 and 0.3 mg/kg/day, respectively. Teratogenic effects were not found at any of the levels tested. Rabbits were administered disulfoton during gestation at oral doses of 0.3, 1.0 or 3.0 mg/kg/day. Due to severe toxic responses and deaths at 3.0 mg/kg, this dose was lowered to 2.0 and later for most animals again to 1.5 mg/kg/day. The NOEL for maternal toxicity was 1.0 mg/kg/day. There was no evidence of disulfoton causing a teratogenic or an embryotoxic effect up to the highest dose tested.

REPRODUCTION.....: In a two-generation reproductive toxicity study, disulfoton was administered to rats at dietary concentrations of 0.5, 2 or 9 ppm. Reproductive and litter effects occurring in conjunction with severe maternal toxicity were observed at the high-dose. These effects included cannibalism, decreased pup body weight, decreased litter size, decreased median number of implantations and effects on cholinesterase activities. The NOELs for parental and reproductive toxicity were 0.5 and 2 ppm, respectively.

NEUROTOXICITY .....: In an acute oral neurotoxicity study using rats, disulfoton was administered as a single dose to males at 0.24, 1.5 or 5.2 mg/kg and to females at 0.24, 0.76 or 1.5 mg/kg. Clinical observations and neurotoxicity evaluations were performed over a period of 15 days followed by a neurohistopathological examination. There was no evidence of neurotoxicity in either sex at any of the dose levels tested. In a supplemental cholinesterase activity study using rats, disulfoton was administered as a single oral dose to males at 0.25, 1.5 or 4.9 mg/kg and to females at 0.25, 0.77 or 1.5 mg/kg. The NOEL for cholinesterase inhibition was 0.25 mg/kg in both sexes. In a 13 week neurotoxicity screening study, disulfoton was administered to rats at dietary concentrations of 0.9, 3.8 and 14.5 ppm. There were behavioral and clinical biochemical evidence of cholinergic toxicity but no evidence of a neurotoxic effect in rats at dietary concentrations up to and including 14.5 ppm, the highest concentration tested. There was no evidence of acute delayed neurotoxicity in antidote protected hens treated with disulfoton at an oral dose exceeding the LD50 in hens.

12. ECOLOGICAL INFORMATION:

This product is toxic to fish and wildlife. Bayer will provide a summary of specific data upon written request. As with any pesticide, this product should be used according to label directions and should be kept out of streams, lakes and other aquatic habitats of concern. In event of a spill emergency, call the emergency number on page 1.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD.....: Follow container label instructions for disposal of wastes generated during use in compliance with the FIFRA product label. In other situations, dispose in a RCRA hazardous waste incinerator.

EMPTY CONTAINER PRECAUTIONS.: Do not reuse the container. When empty, the container is a RCRA hazardous waste and must be managed as a RCRA hazardous waste until it is triple rinsed or cleaned by an equivalent method. Any cleaning residues must be managed as a RCRA hazardous waste. Triple rinsed and clean containers should be disposed in compliance with applicable state and local laws.

14. TRANSPORTATION INFORMATION:

TECHNICAL SHIPPING NAME.....: Disulfoton - 15%
FREIGHT CLASS BULK.....: Insecticides, NOI - NMFC 102100
FREIGHT CLASS PACKAGE.....: Insecticides, NOI - NMFC 102100
PRODUCT LABEL.....: Di-Syston 15% Granular Systemic Insecticide

DOT (DOMESTIC SURFACE)

PROPER SHIPPING NAME.....: Organophosphorus Pesticides, Solid, Toxic
HAZARD CLASS OR DIVISION .....: 6.1
UN/NA NUMBER.....: UN2783
PACKING GROUP .....: II
DOT PRODUCT RQ lbs (kgs).....: 6.7 lbs (3.0 kgs)
HAZARD LABEL(s).....: Toxic
HAZARD PLACARD(s).....: Toxic

* Only bulk packages (greater than 119 gallons) are regulated as Marine Pollutants when shipped by highway or rail (See 49 CFR 171.4 (c)).

14. TRANSPORTATION INFORMATION (Continued)

DOT (continued)

IMO / IMDG CODE (OCEAN)

PROPER SHIPPING NAME.....: Organophosphorus Pesticides, Solid, Toxic
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER.....: UN2783
ADDITIONAL IMO INFORMATION.....: Marine Pollutant; RQ
PACKAGING GROUP.....: II
HAZARD LABEL(s).....: Toxic; Marine Pollutant (Mark)
HAZARD PLACARD(s).....: Toxic; Marine Pollutant

ICAO / IATA (AIR)

PROPER SHIPPING NAME.....: Organophosphorus Pesticides, Solid, Toxic
HAZARD CLASS DIVISION NUMBER...: 6.1
UN NUMBER.....: UN2783
SUBSIDIARY RISK.....: None
PACKING GROUP.....: II
HAZARD LABEL(s).....: Toxic
RADIOACTIVE?.....: Non-Radioactive
PASSENGER AIR - MAX. QTY. .....: 25 kg
PASSENGER PACKING INSTRUCTION..: 613
CARGO AIR - MAX. QTY. .....: 100 kg
CARGO AIR PACKING INSTRUCTION..: 615

15. REGULATORY INFORMATION:

OSHA STATUS.....: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
TSCA STATUS.....: This product is exempt from TSCA Regulation under FIFRA Section 3 (2)(B)(ii) when used as a pesticide.
CERCLA REPORTABLE QUANTITY..: 6.7 pounds of the formulation which contains 1 pound of Disulfoton.
SARA TITLE III:
    SECTION 302 EXTREMELY
      HAZARDOUS SUBSTANCES..: Disulfoton CAS #298-04-4 15%
    SECTION 311/312
      HAZARD CATEGORIES.....: Immediate Health Hazard; Delayed Health Hazard
    SECTION 313
      TOXIC CHEMICALS.....: No components listed.
RCRA STATUS.....: When discarded in its purchased form, this product is a listed RCRA hazardous waste and should be managed as a hazardous waste. (40 CFR 261.20-24)

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16. OTHER INFORMATION:

NFPA 704M RATINGS:

Health	Flammability	Reactivity	Other
3	1	1	

0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

Bayer’s method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. NFPA ratings are provided by Bayer as a customer service.

REASON FOR ISSUE.....: Revise address, telephone nubmers, and new EPA Reg. No.
PREPARED BY.....: T. M. Myers
APPROVED BY.....: S. E. Earnest
TITLE.....: Manager, Quality System Services
APPROVAL DATE.....: 02/28/2003
SUPERSEDES DATE.....: 08/22/2002
MSDS NUMBER.....: 08516
