Material Safety Data Sheet
Rugby® 200 CS

MSDS #: 6044-A
Revision Date: 2014-05-22
Version 1.02

This MSDS has been prepared to meet U.S. OSHA Hazard Communication Standard 29 CFR 1910.1200 And Canadian Workplace Hazardous Materials Information System (WHMIS) requirements.

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	Rugby® 200 CS
Formula code	6044
Active Ingredient(s)	Cadusafos
Alternate Commercial Name	Apache®
Synonyms	CADUSAFOS: S,S-di-sec-butyl O-ethyl phosphorodithioate; O-ethyl S,S-bis(1-methylpropyl) phosphorodithioate
Chemical Family	Organophosphate Pesticide
Recommended use:	Insecticide, Nematicide

Manufacturer

FMC Corporation
Agricultural Solutions
1735 Market Street
Philadelphia, PA 19103
General Information:
Phone: (215) 299-6000
E-Mail: msdsinfo@fmc.com

Emergency telephone number

Medical Emergencies:
1 800 / 331-3148 (PROSAR - U.S.A. & Canada)
1 651 / 632-6793 (PROSAR - All Other Countries - Collect)
For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)

2. HAZARDS IDENTIFICATION

Appearance	suspension
Physical state	Liquid
Odor	Slight mercaptan
Flammable properties	Combustible liquid

Potential health effects

Principal Routes of Exposure	Eye contact, Skin contact, Inhalation, Ingestion.

Acute effects

Eyes	May cause slight irritation.
Skin	Substance may cause slight skin irritation.
Inhalation	May cause irritation of respiratory tract.

Ingestion Harmful if swallowed. Expected to produce cholinesterase inhibition including headache, lightheadedness, weakness, abdominal cramps, nausea, excessive salivation, perspiration and blurred vision. More severe signs of cholinesterase inhibition include tearing, pin-point pupils, excessive respiratory secretions, cyanosis, convulsions, generalized tremor and coma. Excessive cholinesterase inhibition may result in death.

Chronic effects Prolonged exposure caused inhibition of red blood cell and brain cholinesterase, and decreased motor activity.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous ingredients

Chemical Name	CAS-No	Weight %
1,6-hexanediamine (70%)	124-09-4	1-5
Urea	57-13-6	5-10
Phosphoric acid	7664-38-2	1-5
Methylene diphenyl diisocyanate (polymeric)	9016-87-9	5-10
Naphthalene sulfonic acid-formaldehyde condensate, sodium salt	9084-06-4	1-5
Cadusafos	95465-99-9	19.3

4. FIRST AID MEASURES

Eye contact Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for further treatment advice.

Skin contact 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.

Inhalation Move to fresh air. If person is not breathing, call 911 (within the U.S. and Canada) or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

Ingestion Call a 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 a poison control center or doctor. Do not give anything by mouth to an unconscious person.

Notes to physician This product contains a reversible cholinesterase inhibitor. Atropine sulfate is antidotal. Support respiration as needed with removal of secretions, maintenance of a patent airway and, if necessary, artificial ventilation. If cyanosis is absent: Adults - start treatment by giving 2 mg atropine intravenously or intramuscularly, if necessary, and repeat with 0.4 - 2.0 mg atropine at 15 minute intervals until atropinization occurs (tachycardia, flushed skin, dry mouth, mydriasis); Children under 12 - initial dose = 0.05 mg/kg body weight and repeat dose = 0.02 - 0.05 mg/kg body weight. Start 2-PAM at the same time, following manufacturer's recommended dosages and administration. Morphine, reserpine, phenothiazines and theophylline are probably contraindicated. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Observe patient to insure that these symptoms do not recur as atropinization wears off. If in eyes, instill one drop of homatropine. Treatment is otherwise controlled removal of exposure followed by symptomatic and supportive care.

5. FIRE-FIGHTING MEASURES

Flammable properties Combustible liquid

Flash Point 89 - 92 °C / 192-198 °F

Method	Tag Closed Cup
Sensitivity to Mechanical Impact	Not applicable
Sensitivity to Static Discharge	Not applicable
Suitable extinguishing media	Foam. Carbon dioxide (CO_2). Dry powder. Water spray.
Protective equipment and precautions for firefighters	Wear self-contained breathing apparatus and protective suit.

NFPA

Health Hazard	1
Flammability	1
Stability	0
Special Hazards	-

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	Isolate and post spill area. Remove all sources of ignition. Wear suitable protective clothing, gloves and eye/face protection. For personal protection see section 8.
Environmental precautions	Keep people and animals away from and upwind of spill/leak. Keep material out of lakes, streams, ponds, and sewer drains.
Methods for containment	Dike to prevent runoff. Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.
Methods for cleaning up	Clean and neutralize spill area, tools and equipment by washing with bleach water and soap. Absorb rinsate and add to the collected waste. Waste must be classified and labeled prior to recycling or disposal. Dispose of waste as indicated in Section 13.
Other	For further clean-up instructions call FMC Emergency Hotline number listed in Section 1 "Product and Company Identification" above.

7. HANDLING AND STORAGE

Handling	Do not contaminate other pesticides, fertilizers, water, food or feed by storage or disposal.
Storage	Keep in a dry, cool and well-ventilated place. Keep away from open flames, hot surfaces and sources of ignition. Keep out of reach of children and animals. Store in original container only.

8. EXPOSURE CONTROL / PERSONAL PROTECTION

Exposure guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
1,6-hexanediamine (70%) 124-09-4	TWA: 0.5 ppm			
Phosphoric acid 7664-38-2	STEL 3 mg/m³ TWA: 1 mg/m³	TWA: 1 mg/m³	IDLH: 1000 mg/m³ TWA: 1 mg/m³ STEL: 3 mg/m³	Mexico: TWA 1 mg/m³ Mexico: STEL 3 mg/m³

Chemical Name	British Columbia	Quebec	Ontario TWAEV	Alberta
1,6-hexanediamine (70%) 124-09-4	TWA: 0.5 ppm	TWA: 0.5 ppm TWA: 2.3 mg/m³	TWA: 0.5 ppm	TWA: 0.5 ppm TWA: 2.4 mg/m³
Phosphoric acid 7664-38-2	TWA: 1 mg/m³ STEL: 3 mg/m³	TWA: 1 mg/m³ STEL: 3 mg/m³	TWA: 1 mg/m³ STEL: 3 mg/m³	TWA: 1 mg/m³ STEL: 3 mg/m³
Methylene diphenyl diisocyanate (polymeric) 9016-87-9				TWA: 0.005 ppm TWA: 0.07 mg/m³

Occupational exposure controls

Engineering measures Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Personal Protective Equipment

General Information If the product is used in mixtures, it is recommended that you contact the appropriate protective equipment suppliers. These recommendations apply to the product as supplied.

Respiratory protection For dust, splash, mist or spray exposures wear a filtering mask.

Eye/face protection For dust, splash, mist or spray exposure, wear chemical protective goggles or a face-shield.

Skin and body protection Wear long-sleeved shirt, long pants, socks, shoes, and gloves.

Hand protection Protective gloves

Hygiene measures Clean water should be available for washing in case of eye or skin contamination. Wash skin prior to eating, drinking, chewing gum or using tobacco. Shower or bathe at the end of working. Remove and wash contaminated clothing before re-use. Launder work clothing separately from regular household laundry.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	suspension
Color	green
Physical state	Liquid
Odor	Slight mercaptan
pH	7.4-7.9
Melting Point/Range	No information available.
Freezing point	No information available
Boiling Point/Range	Not applicable
Flash Point	89 - 92 °C / 192-198 °F Tag Closed Cup
Evaporation rate	Not applicable
Flammable properties	Combustible liquid
Vapor pressure	No information available
Vapor density	No information available
Specific Gravity	1.05 - 1.07
Bulk density	8.75 - 8.91 lb/gal
Water solubility	No information available
Percent volatile	No information available
Partition coefficient	Not applicable
Viscosity	No information available

10. STABILITY AND REACTIVITY

Stability Stable.

Conditions to avoid Keep away from open flames, hot surfaces and sources of ignition.

Hazardous decomposition products Carbon oxides, Phosphorous oxides, Sulfur dioxide.

Hazardous polymerization Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute effects

Acute Toxicity

Cadusafos is a cholinesterase-inhibiting pesticide, which elicits symptoms in humans typical of cholinesterase inhibition including headaches, light-headedness, weakness, abdominal cramps, nausea, excessive salivation, perspiration and blurred vision. More severe signs of cholinesterase inhibition include tearing, pin-point pupils, excessive respiratory secretions, cyanosis, convulsions, generalized tremor and coma. Excessive cholinesterase inhibition can result in death. Reduction of blood acetylcholinesterase levels can occur without symptoms of toxicity.

Eye contact	Slightly or non-irritating (rabbit).
Skin contact	Slightly or non-irritating (rabbit).
LD50 Dermal	> 5000 mg/kg (Rat)
LD50 Oral	1,097 mg/kg (Rat)
LC50 Inhalation	> 3.87 mg/L 4 hr (Rat)
Sensitization	Non-sensitizer

Chronic effects

Chronic Toxicity	Prolonged exposure caused inhibition of red blood cell and brain cholinesterase, and decreased motor activity.
Carcinogenicity	Cadusafos: No evidence of carcinogenicity from animal studies
Mutagenicity	Cadusafos: Not genotoxic in animal studies
Reproductive toxicity	Cadusafos: No toxicity to reproduction in animal studies.
Neurological Effects	Cadusafos: Chronic exposure to animals caused decreased motor activity and decreased cholinesterase activity in brain, red blood cells and plasma.
Developmental Toxicity	Cadusafos: Not teratogenic in animal studies.
Target Organ Effects	Central nervous system (CNS), Peripheral Nervous System (PNS), Acetylcholinesterase Inhibition.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Very toxic to aquatic organisms.

Cadusafos (95465-99-9)				
Active Ingredient(s)	Duration	Species	Value	Units
Cadusafos	48 h EC50	Crustacea	1.6	µg/L
	96 h LC50	Fish	0.13	mg/L
	72 h EC50	Algae	4.3	mg/L
	21 d NOEC	Crustacea	0.23	µg/L
	21 d NOEC	Fish	5.2	µg/L
	96 h NOEC	Algae	1.0	mg/L

Environmental Fate

Persistence and degradability	Moderately persistent. Does not readily hydrolyze. Not readily biodegradable.
Bioaccumulation	The substance does not have a potential for bioconcentration.
Mobility	Moderately mobile. Has some potential to reach groundwater.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

Improper disposal of excess pesticide, spray mixture, or rinsate is prohibited. If these wastes cannot be disposed of by use according to label instructions, contact appropriate disposal authorities for guidance.

Contaminated packaging

Do not reuse or refill this container. Containers must be disposed of in accordance with local, state and federal regulations. Refer to the product label for container disposal instructions.

14. TRANSPORT INFORMATION

DOT

This material is a Combustible liquid and is, therefore, not subject to the hazardous materials regulations when in non-bulk packages shipped within the USA per 49 CFR §173.150(f)(2).

Packaging Type	Bulk
Proper shipping name	Combustible liquid, n.o.s.
UN/ID No	NA1993
Hazard Class	Combustible
Packing group	III
Description	NA1993, Combustible liquid, n.o.s. (aromatic hydrocarbons), PGIII

TDG

The "Marine Pollutant" marking is only applicable when shipped by vessel, and is not applicable when shipped only by road or rail in Canada.

UN/ID No	UN3082
Proper shipping name	Environmentally hazardous substance, liquid, n.o.s.
Hazard Class	9
Packing group	III
Marine pollutant	Cadusafos.
Description	UN3082 Environmentally hazardous substance, liquid, n.o.s. (Cadusafos), 9, PG III, Marine Pollutant

ICAO/IATA

UN/ID No	UN3082
Proper shipping name	Environmentally hazardous substance, liquid, n.o.s.
Hazard Class	9
Packing group	III
Marine pollutant	Cadusafos
Description	UN3082 Environmentally hazardous substance, liquid, n.o.s. (Cadusafos), 9, PG III, Marine Pollutant

IMDG/IMO

UN/ID No	UN3082
Proper shipping name	Environmentally hazardous substance, liquid, n.o.s.
Hazard Class	9
Packing group	III
EmS No.	F-A, S-F
Marine pollutant	Cadusafos
Description	UN3082 Environmentally hazardous substance, liquid, n.o.s. (Cadusafos), 9, PG III, Marine Pollutant

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Methylene diphenyl diisocyanate (polymeric)	9016-87-9	5-10	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	yes
Fire Hazard	yes
Sudden Release of Pressure Hazard	no
Reactive Hazard	no

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Phosphoric acid	5000 lb	

TSCA Inventory (United States of America)

Component	U.S. - TSCA (Toxic Substances Control Act) - Section 8(d) - 716.120(a) - Health and Safety Reporting - List of Substances
Methylene diphenyl diisocyanate (polymeric) 9016-87-9 (5-10)	06/01/1987

International Regulations

Mexico - Grade Slight risk, Grade 1

Chemical Name	Carcinogen Status	Mexico
Phosphoric acid		Mexico: TWA 1 mg/m^3 Mexico: STEL 3 mg/m^3

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class B3 Combustible liquid

Component	NPRI
Phosphoric acid 7664-38-2 (1-5)	X

16. OTHER INFORMATION

Revision Date: 2014-05-22
Reason for revision: (M)SDS sections updated.

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End of Material Safety Data Sheet