Material Safety Data Sheet

This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products is regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling. All necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	BOLERO® 8 EC (High Flash Formulation)
VC NUMBER(S):	VC-1109
EPA REGISTRATION NUMBER:	59639-79
SYNONYM(S):	None

MANUFACTURER
VALENT USA CORPORATION
P.O. Box 8025
1333 N. California Blvd., Suite 600
Walnut Creek, CA 94596-8025

EMERGENCY TELEPHONE NUMBERS
HEALTH EMERGENCY OR SPILL (24 hr):
(800) 892-0099
TRANSPORTATION (24 hr.): CHEMTREC
(800) 424-9300 or (202) 483-7616

PRODUCT INFORMATION
AGRICULTURAL PRODUCTS: (800) 6VALENT
PROFESSIONAL PRODUCTS: (800) 89VALENT

SECTION 2: COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name (CAS #) [Chemical Name]	Weight Percent	Exposure Limit	Ref.
THIOBENCARB* (28249-77-6) [S-[(4-chlorophenyl)methyl]diethylcarbamothioate]	81.48 - 86.52	None	---
Total Hydrocarbons	4 - 7	500 ppm 300 ppm 100 ppm	OSHA ACGIH Mfgr.
OTHER**	12 – 19	None	---

* Active Ingredient

** Other ingredients, which are maintained as trade secrets, are any substances other than an active ingredient contained in this product. Some of these may be hazardous, but their identity is withheld because they are considered trade secrets. The hazards associated with the other ingredients are addressed in this document. Specific information on other ingredients for the management of exposures, spills, or safety assessments can be obtained by a treating physician or nurse by calling **1-800-892-0099** at any time.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION:
- **CAUSES EYE IRRITATION**
- **HARMFUL IF SWALLOWED**
- **AVOID CONTACT WITH EYES, SKIN, AND CLOTHING**
- **AVOID BREATHING SPRAY MIST**
- **KEEP OUT OF REACH OF CHILDREN**

POTENTIAL HEALTH EFFECTS

Acute Toxicity (Primary Routes of Exposure)

Signs and Symptoms of Systemic Effects: Exposure to lethal or near-lethal levels of thiobencarb technical may cause the following systemic toxic effects: lethargy, salivation, excessive tear formation, labored respiration, loss of balance and decreased body weight.

This product contains a solvent mixture. Solvents, when inhaled, can cause nasal and respiratory irritation and central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possibly unconsciousness and even death. Ingestion of solvents can cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Eye: This product is expected to cause brief and/or minor eye irritation. The expected adverse health effects resulting from an exposure may include redness and possible swelling.

Skin: This product is expected to cause brief and/or minor irritation. The expected adverse health effects resulting from an exposure may include redness and possibly some minor swelling.

This product is not expected to cause allergic skin reactions.

This product has been shown to be minimally toxic when absorbed through the skin. The expected adverse systemic health effects are described above.

Ingestion: This product has been shown to be slightly toxic when ingested. The expected adverse systemic health effects are described above.

Ingestion of this product may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Inhalation: This product has been shown to be minimally toxic when inhaled. The expected adverse systemic health effects are described above.

Exposure to high concentrations in the air may result in respiratory irritation. Signs and symptoms may include, but not be limited to, nasal discharge, sore throat, coughing and difficulty in breathing.

Chronic Toxicity (Including Cancer): Thiobencarb technical did not produce cancer in laboratory animals and there is no evidence that thiobencarb technical causes cancer in humans.

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Symptoms include fatigue, concentration difficulties, anxiety, depression, rapid mood swings and short-term memory loss. The reports are not clear with regard to the types of solvents that may cause these symptoms, and there is controversy among scientists to whether the condition exists or is caused by this type of product. Since many other diseases cause some or all of these conditions, a doctor should be consulted if any appear. Prolonged or repeated dermal exposures may cause drying, scaling and even blistering of the skin.

Teratology (Birth Defects) Information: No developmental toxicity was produced in animals exposed to thiobencarb technical, even at doses that were toxic to the pregnant animal.

Reproduction Information: Thiobencarb technical did not produce reproductive toxicity in animal studies.

Potentially Aggravated Conditions: Individuals with preexisting diseases of the central nervous system may have increased susceptibility to the toxicity of excessive exposures.

For complete discussion of the toxicology data from which this evaluation was made, refer to Section 11. For Regulatory Information, refer to Section 15.

SECTION 4: FIRST AID MEASURES

EMERGENCY NUMBER (800) 892-0099

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact **1-800-892-0099** for emergency medical treatment information.

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.

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.

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

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 advice.

NOTES TO PHYSICIAN: None

SECTION 5: FIRE FIGHTING MEASURES

FLASH POINT: 197º F **METHOD:** Setaflash Closed Cup Tester
AUTOIGNITION: NA
EXTINGUISHING MEDIA: CO_2, dry chemical, foam, water fog.

FLAMMABLE LIMITS (% by volume in air): Lower: NDA Upper: NDA

NFPA RATINGS: Health 1; Flammability 2; Reactivity 1; Special None

(Least-0, Slight-1, Moderate-2, High-3, Extreme-4). These values are obtained using professional judgement. Values were not available in the guidelines or published evaluations prepared by the National Fire Protection Association, NFPA.

FIRE FIGHTING INSTRUCTIONS: Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 85 ^{o} F.

Products of combustion from fires involving this material may be toxic. Avoid breathing smoke and mists. Avoid personnel and equipment contact with fallout and runoff. Minimize the amount of water used for fire fighting. Do not enter any enclosed area without full protective equipment, including self-contained breathing equipment. Contain and isolate runoff and debris for proper disposal. Decontaminate personal protective equipment and fire fighting equipment before reuse. Read the entire document.

HAZARDOUS COMBUSTION PRODUCTS: Normal combustion forms carbon dioxide, water vapor and may produce oxides of sulfur and nitrogen. Combustion may produce toxic compounds of chlorine. Incomplete combustion can produce carbon monoxide.

SECTION 6: ACCIDENTAL RELEASE MEASURES

VALENT EMERGENCY PHONE NUMBER: (800) 892-0099
CHEMTREC EMERGENCY PHONE NUMBER: (800) 424-9300
OBSERVE PRECAUTIONS IN SECTION 8: PERSONAL PROTECTION

Stop the source of the spill if safe to do so. Contain the spill to prevent further contamination of the soil, surface water, or ground water.

FOR SPILLS ON LAND:

CONTAINMENT: Avoid runoff into storm sewers and ditches which lead to waterways. Contain spilled liquids with dry sorbents.
CLEANUP: Clean up spill immediately. Absorb spill with inert material (such as dry sand or earth), then place in a chemical waste container. Wash area with soap and water. Pick up wash liquid with additional absorbent and place in a chemical waste container.

FOR SPILLS IN WATER:

CONTAINMENT: This material forms an emulsion in water. Stop or reduce contamination of any water. Isolate contaminated water.
CLEANUP: Remove contaminated water for treatment or disposal.

SECTION 7: HANDLING AND STORAGE

END USER MUST READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

DO NOT USE OR STORE near flame, sparks or hot surfaces. Use only in well ventilated area. Keep container closed.

DO NOT weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous or explosive vapor or liquid.

Keep pesticide in original container. Do not store or transport near food or feed. Do not contaminate food or feed. Do not put concentrate into food or drink containers. Do not dilute concentrate in food or drink containers. Store in a cool, dry place, out of direct sunlight.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

END USER MUST READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL.

EYE PROTECTION: Do not get this material in your eyes. Eye contact can be avoided by wearing protective eyewear.

RESPIRATION/VENTILATION: Use this material only in well ventilated areas. Unless ventilation is adequate to keep airborne concentrations below recommended exposure standards, approved respiratory protection should be worn.

SKIN PROTECTION: Avoid contact with skin or clothing. Skin contact should be minimized by wearing protective clothing including gloves.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Amber liquid
ODOR:	Moderately pungent odor
BOILING POINT:	NDA
DENSITY:	1.1401 g/ml
SOLUBILITY:	Emulsifies in water
VAPOR PRESSURE:	2×10^{-5} mm Hg @ 23º C (thiobencarb)
pH:	6.1 (1% emulsion)
VISCOSITY:	46.1 cps @ 22º C, 28.1 cps @ 41º C (159 SUS @ 100º F)
CORROSION CHARACTERISTICS:	NDA

SECTION 10: STABLITY AND REACTIVITY

CHEMICAL STABILITY: Stable
INCOMPATIBILITY: NDA
HAZARDOUS DECOMPOSITION PRODUCTS: NDA
OXIDATION/REDUCTION PROPERTIES: No reaction with oxidizing (1% potassium permanganate) or reducing (zinc) agents.

SECTION 11: TOXICOLOGICAL INFORMATION

ACUTE (Product Specific Information):

Eye Irritation: Eye irritation test produced reversible slight to severe ocular effects which cleared within 7 days. (Toxicity Category III)

Skin Irritation: Skin irritation tests produced reversible slight to moderate irritation which cleared within 7 days (Toxicity Category IV)

Dermal Toxicity: The dermal LD_{50} in rabbits is > 5 g/kg. (Toxicity Category IV)

Oral Toxicity: The oral LD_{50} in male rats is 2810 mg/kg and in females it is 1340 mg/kg. (Toxicity Category III)

Inhalation Toxicity: The 4-hour LC50 in rats is greater than 11.4 mg/L (Toxicity Category IV) Exposure to high concentrations in the air may result in respiratory irritation.

Skin Sensitization: This product did not produce a skin sensitization reaction in Guinea pigs in a Modified Buehler test.

TOXICITY OF THIOBENCARB TECNICAL

SUBCHRONIC: The dermal administration of Bolero 8 EC to rats, six hours per day, five days per week for three weeks, at doses up to 500 mg/kg/day caused reduced body weight gains, body weight and food efficiency. Slight increases in red, dry and flaky skin were observed. The LOEL was 40 mg/kg/day. An eight week dietary range-finding study in rats with thiobencarb technical at doses up to 450 mg/kg/day produced effects consistent with poor palatability (taste) such as weight loss, decreased food consumption, etc. In a 4-week oral toxicity study with thiobencarb technical in dogs with doses of 1, 4, 16 and 64 mg/kg/day, the primary observation was decreased plasma cholinesterase values in the 16 and 64 mg/kg/day dose groups

NEUROTOXICITY: Based on acute and subchronic (13-week) studies in rats, thiobencarb technical is not expected to be neurotoxic. The systemic and neurobehavioral NOEL in the rat acute study was 100 mg/kg based on increased clinical signs and gait abnormalities, decreased sensory responses, decreased body temperature and decreased motor activity. In the subchronic study, the systemic NOEL was 2 mg/kg/day based on increased clinical signs, decreased body weights, and increased liver and kidney weights. The neurotoxicity NOEL was $\geq$ 100 mg/kg/day, the highest dose tested.

CHRONIC/CARCINOGENICITY: Prolonged administration of the active ingredient thiobencarb technical to rats, mice and dogs did not increase their incidence of cancer over that of untreated animals. The primary significant findings were generally attributable to the poor palatability of the diet (e.g. weight loss). The 2 year mouse oncogenicity study demonstrated no oncogenic potential. The systemic NOEL was 3 mg/kg/day for males and 5 mg/kg/day for females based on histopathological changes in the liver. The 2-year rat oncogenicity study showed no carcinogenicity at 25 mg/kg/day and a systemic NOEL of 1 mg/kg/day based on decreased body weight gain, food consumption and efficiency and increased blood urea nitrogen. A 1-year dog study showed a systemic NOEL of 8 mg/kg/day based on decreased body weight gain, increased liver and kidney weights, and hematological and clinical chemistry changes, and a plasma cholinesterase NOEL of 1 mg/kg/day.

TERATOLOGY/DEVELOPMENTAL TOXICITY: Thiobencarb technical did not cause birth defects when tested in experimental animals. Teratology studies conducted in rats with 5, 25 and 150 mg/kg for gestation days 6 to 19 show no teratogenic effects at any dose level. Treatment with 150 mg/kg did, however, result in reduced maternal body weight gain and in reduced fetal weights. The maternal and developmental NOELs are 25 mg/kg/day. A teratology study was also conducted in rabbits at dose levels of 2, 20 and 100 mg/kg/day for the day 7-29 gestation period. Maternal body weight gain and mean fetal weights were reduced at 20 and 100 mg/kg/day dose levels, but there were no teratogenic effects. Shortening the treatment period in rabbits to gestation day 6 - 18 reduced maternal and fetal toxicity. Treatment with 20, 100 and 200 mg/kg/day produced no fetal toxicity, teratogenicity or significant maternal effects. Therefore, the maternal NOEL is 100 mg/kg/day and the developmental NOEL is 200 mg/kg/day (the highest dose tested).

REPRODUCTION: Two generation reproduction studies conducted with thiobencarb technical in rats at dose levels ranging from 2 to 100 mg/kg/day did not impair reproductive performance. Relative and absolute liver and kidney weights were increased in both F0 and F1 generations at 20 and 100 mg/kg/day. Decreased body weight gain was observed at 100 mg/kg/day in both generations of the male and in the F1 female generation. The reproductive toxicity NOEL was 100 mg/kg/day.

MUTAGENICITY: Thiobencarb technical is not expected to pose a genetic hazard. It has been studied in *in vitro* assays for gene mutation, structural chromosome aberrations and DNA damage/repair as well as *in vivo* assays measuring micronucleus formation and in the dominant lethal assay. The results for all tests except the *in vivo* micronucleus test were negative. This single report of a positive response is not cause for concern when evaluated in the context of the oncogenicity, teratogenicity and reproductive toxicity studies.

TOXICITY OF OTHER INGREDIENTS:

This product contains a solvent mixture. Solvents, when inhaled, can cause nasal and respiratory irritation and central nervous system effects including dizziness, weakness, fatigue, nausea, headache and possibly unconsciousness and even death. Ingestion of solvents can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Prolonged or repeated dermal exposures may cause drying, scaling and even blistering of the skin.

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Symptoms include fatigue, concentration difficulties, anxiety, depression, rapid mood swings and short-term memory loss. The reports are not clear with regard to the types of solvents that may cause these symptoms, and there is controversy among scientists to whether the condition exists or is caused by this type of product. Since many other diseases cause some or all of these conditions, a doctor should be consulted if any appear.

For a summary of the potential for adverse health effects from exposure to this product, refer to Section 3. For information regarding regulations pertaining to this product, refer to Section 15.

SECTION 12: ECOLOGICAL INFORMATION

The following studies were conducted with thiobencarb technical.

AVIAN TOXICITY: Thiobencarb technical is practically nontoxic to birds. Test results include:

Oral LD_{50} Northern bobwhite: >1938 mg/kg
Oral LC_{50} (feeding for 8 weeks) Northern bobwhite: >5620 ppm
Oral LC_{50} (feeding for 5 days) Mallard duck: >5000 ppm
Reproduction (Northern bobwhite): NOEC: 267 ppm; LOEC: 930 ppm
Reproduction (Mallard duck): NOEC: 100 ppm; LOEC: 300 ppm

AQUATIC ORGANISM TOXICITY:
Freshwater species: Thiobencarb technical is moderately to highly toxic to freshwater fish and invertebrates. Studies with the technical material and the formulated product show that the LC_{50}'s were generally greater than 1 ppm. The following LC_{50} values summarize the acute toxicity findings for Bolero 8 EC.

Bluegill sunfish: 1.7 ppm
Rainbow trout:: 1.1 ppm
Channel catfish: 2.3 ppm
Daphnid: 0.17 ppm
Scud Gammarus: 1.0 ppm
Apple snail: 1.85 ppm

Thiobencarb technical can inhibit the reproduction in freshwater invertebrates (Daphnid) at concentrations as low as 3.0 µg/L.

Marine/estuarine species: Thiobencarb technical and Bolero 8 EC are moderately to highly acutely toxic to marine/estuarine fish and invertebrates.

OTHER NON-TARGET ORGANISM TOXICITY: Exposure to non-target organisms such as honey bees is not expected under normal use conditions.

SECTION 13: DISPOSAL CONSIDERATIONS

END USERS MUST DISPOSE OF ANY UNUSED PRODUCT AS PER THE LABEL RECOMMENDATIONS.

DISPOSAL METHODS: Check governmental regulations and local authorities for approved disposal of this material. Dispose in accordance with applicable laws and regulations.

SECTION 14: TRANSPORT INFORMATION

D.O.T. SHIPPING NAME:	Compounds, weed killing, liquid, non-regulated
TECHNICAL SHIPPING NAME:	Thiobencarb 84% Solution
RQ:	2,197 gallons
D.O.T. HAZARD CLASS:	NA
U.N./N.A. NUMBER:	NA
REMARKS:	Regulated when shipped in bulk (>119 gal.)
EXEMPTION REQUIREMENT:	49 CFR 173.150

SECTION 15: REGULATORY INFORMATION

REGULATIONS UNDER FIFRA: All pesticides are governed under FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act). Therefore, the regulations presented below are pertinent only when handled outside of the normal use and applications of pesticides. This includes waste streams resulting from manufacturing/formulation facilities, spills or misuse of products, and storage of large quantities of products containing hazardous or extremely hazardous substances.

OTHER U.S. FEDERAL REGULATIONS:

OSHA: See Section 2
CERCLA RQ*: Product RQ 2,197 gallons, Naphthalene RQ 100 lbs.
RCRA:** NA
SARA TITLE III:

Sara (313) Chemicals: thiobencarb is subject to reporting under Section 313 and Section 6607 of the Pollution Prevention Act.

Sara (311,312):

Immediate Health Effects: YES
Chronic Health Effects: YES
Fire Hazard: YES
Sudden Release of Pressure: NO
Reactivity Hazard: NO

Sara Section 302: NA

This product is not listed as a carcinogen by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), or the Occupational Safety and Health Administration (OSHA).

STATE REGULATIONS: Each state may promulgate standards more stringent than the federal government. This section cannot encompass an inclusive list of all state regulations. Therefore, the user should consult state or local authorities.

* RQ: Reportable Quantity

** RCRA waste codes must be determined on a case-by-case basis (i.e., spill, processing waste, etc.).

For information regarding potential adverse health effects from exposure to this product, refer to Sections 3 and 11.

SECTION 16: OTHER INFORMATION

REASON FOR ISSUE:	Format revisions, revisions throughout MSDS
REVISION NUMBER:	3
REVISION DATE:	08/25/2000
SUPERSEDES DATE:	06/07/1999
MSDS NUMBER:	0134

THE INFORMATION IN THIS MSDS IS BASED ON DATA AVAILABLE TO US AS OF THE REVISION DATE GIVEN HEREIN, AND BELIEVED TO BE CORRECT. CONTACT VALENT USA CORPORATION TO CONFIRM IF YOU HAVE THE MOST CURRENT MSDS.

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