



MATERIAL SAFETY DATA SHEET

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Pentathlon® LF

Date Prepared: June 26, 2002

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT IDENTIFICATION

Product Name: Pentathlon® LF
Chemical Name: Mancozeb

HAZARD CLASSIFICATION (0-minimal, 1-slight, 2-moderate, 3-serious, 4-severe)

NFPA: HEALTH-1 FIRE-1 REACTIVITY-0
HMIS: HEALTH-1 FIRE-1 REACTIVITY-0

MANUFACTURER NAME AND ADDRESS (additional addresses found in Section 16)

Griffin L.L.C.
2509 Rocky Ford Road
P.O. Box 1847
Valdosta, GA 31603-1847

EMERGENCY TELEPHONE NUMBERS

Griffin L.L.C. (USA): (+1) (800) 237 1854
Prosar: (+1) (888) 324 7598
Chemtrec: (+1) (800) 424 9300

2. COMPOSITION/ INFORMATION ON INGREDIENTS

Component Name	% by Wt.	CAS#
Mancozeb	37	8018-01-7
Inert ingredient	63	

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

The primary routes of exposure are by inhalation, eye contact, and skin contact.

POTENTIAL HEALTH EFFECTS

Inhalation: Inhalation of vapor or mist can cause irritation of the nose and throat.
Eye Contact: Direct contact with material can cause possible irritation.
Skin Contact: Prolonged or repeated skin contact can cause possible skin irritation and dermatitis.

3. HAZARDS IDENTIFICATION (con't)



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Delayed Effects:

Mancozeb at high levels has caused birth defects in test animals, hind leg paralysis and an increased incidence of retinal atrophy related to old age. It has caused thyroid tumors in test animals, resulting from ethylene thiourea (ETU) formation. ETU, a trace contaminant and breakdown product of Pentathlon® LF (Mancozeb) Fungicide, primarily affects the thyroid. It has also caused other endocrine, liver and blood effects, tumors and birth defects in test animals.

4. FIRST AID MEASURES

Inhalation: Move victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get professional medical attention immediately.

Eye Contact: Flush with a large amount of water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention if irritation persists.

Skin Contact: Wash affected skin areas thoroughly with soap and water for 15-20 minutes until no evidence of chemical remains. Get professional medical attention immediately if irritation persists.

Ingestion: If swallowed, give 2 glasses of water to drink. Get professional medical attention. Never give anything by mouth to an unconscious person.

5. FIRE FIGHTING MEASURES

Flash point: Not applicable
Flammability Limits: Not applicable
Autoignition Temperature: Not applicable

FIRE FIGHTING HAZARDS & PROCEDURES

Unusual Hazards: Pesticide particulates can become airborne. Combustion generates toxic fumes of hydrogen sulfide, carbon disulfide, sulfur oxides, nitrogen oxides, and carbon oxides.

Extinguishing Agents: Use carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Personal Protective Equipment: Wear self-contained breathing apparatus (pressure demand MSHA/NIOSH approved or equivalent) and full protective gear.

5. FIRE FIGHTING MEASURES (con't)



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Special Procedures: Contain run-off. Remain upwind. Avoid breathing smoke. Use water spray to cool containers exposed to fire.

6. ACCIDENTAL RELEASE MEASURES

Personal Protection: Appropriate protective equipment must be worn when handling a spill of this material. See Section 8, Exposure Controls/ Personal Protection, for recommendations. If exposed to material during clean-up operations, see Section 4, First Aid Measures, for actions to follow. Remove all contaminated clothing promptly. Wash all exposed skin areas with soap and water immediately after exposure. Thoroughly launder clothing before reuse. Do not take clothing home to be laundered.

Procedures: Contain spills immediately with inert materials (e.g. sand, earth). Transfer liquids and solid diking material to separate suitable containers for recovery or disposal. Flush cleaned area with water to a sewage treatment facility.

CAUTION: Keep spills and cleaning runoff out of municipal sewers and open bodies of water.

7. HANDLING AND STORAGE

Storage Conditions: Do not store this material near food, feed or drinking water. Store in a cool, dry, dark area that is well ventilated. Keep container tightly closed when not in use. Keep from freezing; material stability may be affected. The maximum recommended storage temperature for this material is 49° C/120° F.

Handling Procedures: Do not handle material near food, feed or drinking water.

Other: Triple rinse (or equivalent) and puncture empty container. Dispose empty container in a sanitary landfill or by incineration as allowed by state and local authorities. Avoid inhalation of smoke if incinerated.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Respiratory Protection: A respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a



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respirator's use. None are required if airborne concentrations are maintained below the TWA/TLV's listed in Exposure Limit Information.

Up to 10 times the TWA/TLV: Wear a MSHA/NIOSH approved (or equivalent) half-mask, air-purifying respirator.

Up to 100 times the TWA/TLV: Wear a MSHA/NIOSH approved (or equivalent) full-face piece, air-purifying respirator.

Above 100 times the TWA/TLV or Unknown: Wear a MSHA/NIOSH approved (or equivalent) self-contained breathing apparatus in the positive pressure mode, or MSHA/NIOSH approved (or equivalent) full-face piece airline respirator in the positive pressure mode with emergency escape provisions. Air-purifying respirators should be equipped with pesticide cartridges (organic vapor cartridge and pesticide prefilter).

Eye Protection: Use chemical splash goggles (ANSI Z87.1 or approved equivalent).

Hand Protection: Chemically resistant gloves should be worn whenever this material is handled. Polyvinyl chloride gloves may provide protection against permeation. Gloves of other chemically resistant materials may not provide adequate protection. Gloves should be removed and replaced immediately if there is any indication of degradation or chemical breakthrough. Rinse and remove gloves immediately after use. Wash hands with soap and water.

Other Protection: Use chemically resistant apron or other impervious clothing to avoid prolonged or repeated skin contact. Work clothing should be removed at the end of the shift and laundered by the employer.

Engineering Controls (Ventilation): Use local exhaust ventilation with a minimum capture velocity of 150 ft/min (0.75 m/sec) at the point of duct or mist evolution. Refer to the current edition of Industrial Ventilation: A Manual of Recommended Practice published by the American Conference of Governmental Industrial Hygienists for information on the design, installation, use, and maintenance of exhaust systems.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Pale Yellow
Physical State:	Liquid
Odor:	Sulphur odor
Boiling Point:	100° C/212° F Water
Melting Point:	0° C/32° F Water



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Density:	1.30 g/cm ³
Specific Gravity (H ₂ O=1):	1.29 to 1.31 g/cm ³
Solubility in Water (@ 20° C):	Dispersible
Vapor Pressure:	2266.5 Pa @ 20° C/68° F Water
pH @ 20° C:	7.5
Viscosity:	1160 cps
Vapor Density (Air=10):	< 1 Water
Evaporation Rate (BAc - 1):	< 1 Water
Percent Volatility:	53 to 56% Water

10. STABILITY AND REACTIVITY

Stability:	Material is considered stable, however, temperatures above 49° C/120° F should be avoided.
Hazardous Decomposition Products:	Thermal decomposition may yield carbon disulfide and hydrogen sulfide.
Hazardous Polymerization:	Material is not known to polymerize.
Incompatibility:	Avoid contact with oxidizing agents and acids.

11. TOXICOLOGICAL INFORMATION

ACUTE

Inhalation:	Acute inhalation LC ₅₀ = 4.8 mg/L (rat - 4 hour).
Eye Irritation:	Moderate eye irritant.
Skin Irritation:	Minimally irritating to the skin. Material is not considered to be a contact sensitizer.
Skin Absorption:	Acute dermal LD ₅₀ > 2000 mg/kg (rabbit).
Ingestion:	Acute oral LD ₅₀ > 5000 mg/kg (rat).

SUBCHRONIC/CHRONIC DATA

Toxic effects of Mancozeb arise from its metabolism in small amounts to ETU. ETU inhibits thyroid hormone synthesis stimulating pituitary secretion of TSH leading to thyroid changes. At high doses of Mancozeb, sufficient amounts are converted to ETU to alter thyroid hormone levels and cause other effects that result from this alteration. In addition, ETU also affects other endocrine organs, the liver and blood. In studies with Mancozeb, a two-year feeding study in rats indicated thyroid effects and tumors and an increased incidence of old age-related retinopathy at a dietary concentration of 750 ppm. The NOEL was 125 ppm (5-7 mg/kg/day).

11. TOXICOLOGICAL INFORMATION (con't)

SUBCHRONIC/CHRONIC DATA

An 18 month feeding study in mice indicated thyroid effects at 1000 ppm. The NOEL was 100 ppm (13-18 mg/kg/day). A one-year feeding study in dogs indicated effects on the thyroid, liver, blood and other organs at 800 ppm or higher levels. The NOEL was 200 ppm (6 mg/kg/day). Thus, the overall NOEL from long-term feeding studies with Mancozeb is 5-7 mg/kg/day. The overall NOEL from long-term feeding studies with ETU is 0.2 mg/kg/day.



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CARCINOGENICITY DATA

A two-year feeding study with Mancozeb indicated thyroid tumors in rats at a dietary concentration level of 750 ppm. No evidence of carcinogenicity was observed in long-term studies with mice. Two-year feeding studies of ETU indicated thyroid and pituitary tumors in rats at dietary concentrations of 83 ppm or higher and also thyroid, pituitary and liver tumors in mice at dietary concentrations of 330 ppm or higher.

CARCINOGENIC DATA

Carcinogenic effects are considered to be secondary to inhibition of thyroid synthesis and disruption of hormonal balance.

MUTAGENICITY DATA

Both Mancozeb and ETU have been adequately tested in a wide variety of in vivo and in vitro mutagenicity tests. The weight of the evidence of these tests indicates that mancozeb and ETU are not mutagenic in mammalian systems.

REPRODUCTIVE/TERATOLOGY DATA

No reproductive effects were seen in two-generation rat studies with Mancozeb or ETU.

Developmental toxicity studies with Mancozeb indicated a maternal toxicity level of 80 mg/kg/day in rabbits. There was no evidence of developmental toxic effects. The NOEL was 30 mg/kg/day.

REPRODUCTIVE/TERATOLOGY DATA

In the rat, a developmental toxicity study indicated a maternal toxicity level of 128 mg/kg/day; developmental effects including malformations were noted at 512 mg/kg/day. The NOEL was 32 mg/kg/day. In developmental toxicity studies with ETU, malformations were produced at thyroid inhibiting levels in studies with rats and hamsters. No malformations were produced in rabbits, mice, guinea pigs or cats. The overall NOEL is 5 mg/kg/day in the rat.

SENSITIZATION DATA

Sensitization data for a compositionally similar material are listed below:

This product has not been shown to cause skin sensitization in guinea pigs by the Buehler's contact method, although a Mancozeb product has been reported positive in the Maximization method in guinea pigs. These results indicated this product may have a weak potential for skin sensitization in humans.

11. TOXICOLOGICAL INFORMATION (con't)

OTHER TOXICITY DATA

A three-month feeding study in rats indicated hind leg paralysis after a two-week exposure, at a high dose level of 5000 ppm, which also caused significant systemic toxicity and 40% mortality.

ACCEPTABLE DAILY INTAKE for Mancozeb: 0.05 mg/kg/day.

ACCEPTABLE DAILY INTAKE for ETU: 0.002 mg/kg/day (PROPOSED).

12. ECOLOGICAL INFORMATION



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ENVIRONMENTAL TOXICITY (Mancozeb)

Mysid shrimp (*Mysidopsis bahia*), 96 hour LC₅₀, acute flow through: 25.7 ug/L

Oyster shell (*Crassostrea virginica*), deposition EC₅₀: 5.88 mg/L

Daphnia magna, 48 hour LC₅₀: 23 mg/L

Rainbow trout (*Salmo gairderi*), 96 hour LC₅₀: 1.1 mg/L

Bluegill Sunfish (*Lepomis macrochirus*), 96 hour LC₅₀, acute flow through: 1 mg/L

Sheepshead minnow (*Cyprinodon variegatus*), 96 hour LC₅₀, acute flow through: 2.97 mg/L

This product is toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas.

13. DISPOSAL CONSIDERATIONS

For disposal, incinerate this material at a facility that complies with local, state and federal regulations.

14. TRANSPORT INFORMATION

Department of Transportation (DOT):

Not Regulated (non-bulk)

MARINE POLLUTANT (bulk) and Environmentally Hazardous Substance (bulk)

RQ for ethylenebisdithiocarbamic acid, manganese salt (mancozeb) = 5000 lbs (2270 kg)

International Air Transport Association (IATA):

Not Regulated

International Maritime Organization (IMO):

Proper Shipping Name: Environmentally Hazardous Substance, Liquid, N.O.S. (Mancozeb 37% aqueous suspension)

Class: 9

Identification Number: UN 3082

Packing Group: III

RQ: 5000 lbs (2270 kg)

Special Notes: MARINE POLLUTANT

"RQ" must be added to proper shipping name for bulk shipments of 5000 lbs or more mancozeb per package.

15. REGULATORY INFORMATION

OSHA: This product is considered hazardous under the OSHA Hazardous Communication Standard (29 CFR §1910.1200).

TSCA: All product components are on the TSCA Chemical Inventory.

CERCLA: Releases of this material (mancozeb as ethylenebisdithiocarbamic acid, salts, and esters CAS # 111-54-6; RQ: 5000 lbs) to air, land, or water are reportable to the National Response Center under the



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RCRA: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or to the state and local emergency planning committees under the Superfund Amendments and Reauthorization Act (SARA) Title III Section 304 and 40 CFR Part 302. Wastes of this commercial chemical product are classified as hazardous by 40 CFR §261.33 being a listed waste U114.

SARA TITLE III
 302: Not listed
 311/312 Hazard Categories: This product has been reviewed according to the EPA "Hazard Categories" and is categorized as acute and chronic health hazards (40 CFR §370.41).

313 Reportable Ingredients: This product contains materials (CAS # 12427-38-2) listed in Section 313 of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR Part 372.

STATE REGULATIONS:
 California: This product contains Mancozeb and ETU chemicals known to the State of California to cause cancer in laboratory animals. ETU is also known to the State of California to cause birth defects or other reproductive harm in laboratory animals (CALIFORNIA PROPOSITION 65).

16. OTHER INFORMATION

This Material Safety Data Sheet has been revised using the standard Griffin ANSI Z400.1 compliant format and replaces the one dated December 7, 2001. Changes were made in Sections 4 and 11. Pentathlon® is a registered trademark of Griffin Corporation.

GRIFFIN L.L.C. ADDRESSES:

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011 86 20 8387 2869

011 61 7 3369 5400

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The information in this Material Safety Data Sheet relates to this specific material. It may not be valid for this material if used in combination with any other materials or in any process. It is the Users' responsibility to satisfy themselves as to the suitability and completeness of this information for their own particular use.