Material Safety Data Sheet  
Mancozeb 88% TC

1. CHEMICAL PRODUCT IDENTIFICATION
Product Name: Mancozeb 88% Technical  
Manufacturer/information service:  
Manufacturer: Shanghai Tenglong Agrochem Co., Ltd.  
Telephone: +86 21 5506 3225  
UN Number: 3077  
Dangerous Goods Class: 9 (Miscellaneous dangerous goods).  
Proper Shipping Name: Environmentally Hazardous Substance, Solid, N.O.S.  
Packaging Group: III.  
Hazchem Code: 2X.  
Emergency Procedure Guide: 9C1  
Poisons Schedule: S5.  
Chemical family: Ethylenebisdithiocarbamate (dithiocarbamate).  
Use: Agricultural Fungicide for the control of certain diseases of fruit peanuts, soybeans, tobacco and vegetables

Physical Description / Properties  
Physical State: powder  
Colour: grayish yellow  
Odour: Musty sulphur like  
Density: 0.6376g/cm³  
Melting point: 136°C (Decomposing before this degree)  
Vapour Pressure: 1.33 × 10⁻⁵ Pa  
Flash point: 137.8°C (Ting open cup)  
Solubility: 6.2mg/L in water, insoluble in most organic solvents.

2. COMPOSITION / INFORMATION ON INGREDIENTS
Composition | CAS No. | Content (w/w)  
--- | --- | ---  
Mancozeb | 8018-01-7 | 88%  
Other ingredients determined not to be hazardous | - | to 100%

3. HAZARDS IDENTIFICATION
Health Effects  
Swallowed: Very low toxicity by ingestion. Acute Oral LD50 > 5000 mg/kg. Based on animal studies, long-term exposure to high levels of mancozeb may cause abnormal thyroid function. Individuals with pre-existing diseases of the thyroid may have increased susceptibility to the toxicity of excessive exposures.
Eye: May be slightly irritating.
Skin: Acute Dermal LD50 > 5000 mg/kg. Not irritating. In certain situations may cause
sensitization by skin contact.
Inhalation: Harmful by inhalation. Acute Inhalation LD50 > 5.14 mg/L for 4 hour. Irritating to
the respiratory system.
Chronic
Inhalation: The effects in animals from repeated high doses of mancozeb (dust) equivalent to
150-250 times the AEL include reduced body weight, inflammation of the lungs, and abnormal
thyroid function.
Swallowed: Toxic effects in animals from repeated ingestion of high doses include reduced body
weight and thyroid effects. Increased incidences of thyroid tumors and ocular lesions (retinopathy)
were observed in rats administered 750 ppm (equivalent to approximately 35 mg/kg/day) of
mancozeb in their diet for two years. This compound is considered to show weak carcinogenic
activity. Tests in some animals indicate that the compound may produce embryo and fetal toxicity,
but only at maternally toxic doses. Multigeneration studies in animals demonstrate no
reproductive toxicity. Although there have been isolated reports in the scientific literature of
mutagenic activity of mancozeb, in general mancozeb is not genotoxic in animals or in cell
cultures. Mancozeb has been tested for heritable gene mutation. Ethylenethiourea (ETU), a
breakdown product and minor metabolite of mancozeb, was shown to induce liver tumors in mice,
but not in rats or hamsters, and caused thyroid tumors in rats. ETU is not genotoxic. ETU has been
categorized as a probable human carcinogen by IARC and as a group B carcinogen by NTP. At
sufficiently high doses ETU has also caused birth defects in laboratory animals.
Carcinogenicity: None of the components present in this material at concentrations equal to or
greater than 0.1% are listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.

4. FIRST AID MEASURES
Swallowed: If poisoning occurs, contact a doctor or Poisons Information Centre. Avoid giving
alcohol. DO NOT induce vomiting. Do not give anything by mouth to an unconscious person.
Avoid giving alcohol.
Eye Contact: Hold eyelids open and flush with water for 15 minutes until no evidence of
chemical remains. Seek medical attention immediately if irritation persists.
Skin Contact: Remove contaminated clothing and shoes. Wash with plenty of soap and water
until no evidence of chemical remains. Seek medical attention immediately if irritation persists.
Inhalation: Irritating to the respiratory system. Remove victim to fresh air. If not breathing, give
artificial respiration preferably mouth-to-mouth. Seek medical attention immediately.
Advice to Doctor: No specific requirements. Treat symptomatically.

5. FIRE-FIGHTING MEASURES
Extinguishing means: Water spray, foam, dry chemical powder.
Unsuitable extinguishing means: Water jet.
Special exposure hazards: By thermic decomposition, possibility of formation of toxic gases
(sulfur oxide, phosphorus oxide, nitrogen oxide, carbon oxide, chlorides).
Particular protective measures: Intervention personnel should wear mask and individual
respiratory equipment. Retain water or extinguishing media and eliminate safely.
6. ACCIDENTAL RELEASE MEASURES

**Personal protection:** Withdrawal combustion sources, sufficient respiratory ventilation / protection, fight against dusts, prevention to skin and eyes contact.

**Environmental protection:** Avoid sewage, surface water, ground water and soil contamination. Retain spilled liquids and collect them with sand or other absorbent inert material (sepiolite). Absorbent inert material stocks have to be sufficient to face reasonably predictable spillage. Keep sewers from potential spillage to minimize pollution hazards. Do not throw washing waters into sewers. Contact competent authorities when a situation cannot be controlled rapidly and efficiently. In the case of spillage into water, stop dispersion of the product with adequate barrier.

**Methods for cleaning up:** Collect contaminated products on the surface concerned, transfer to closed drums before sending in a specialized incineration treatment center. Wash the contaminated surface with water and collect washing waters for treatment. Cover the contaminated zone using absorbent materials such as sand or sepiolite.

7. HANDLING AND STORAGE

**Storage:** This product is classified as a Dangerous Good of Class 9, UN No. 3077 with Proper Shipping Name ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. EPG 9C1, Hazchem Code 2X. Store in a well ventilated place. Keep container tightly closed. Do not store or consume food, drink or smoke in areas where they may become contaminated with this material. Never allow the product to become wet during storage. This may lead to chemical changes, which will reduce the effectiveness as fungicide and can create flammable vapours.

**Handling:** Users should wash hands before eating, drinking, smoking or using the toilet. Remove personal protective equipment immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing. Avoid dust regeneration.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Exposure Standards:** No exposure standard has been set by NOHSC. The following Acceptable Exposure Limit (AEL) has been set.

Mancozeb 2 mg/m³ (8 hour) total dust; 1.5 mg/m³ (12 hour) total dust.

**Engineering Controls:** Provide local exhaust ventilation and/or general dilution ventilation to meet published exposure limits.

**Personal Protection:**

**Respiratory Protection:** Wear dual cartridge respirator for dusts and mists. Avoid breathing dust, vapours or mist.

**Eye Protection:** Wear protective eyewear to prevent contact with this substance.

**Protective Clothing:** Avoid contact with eyes, skin or clothing. Mixers and loaders must wear coveralls over long-sleeved shirt and long pants, shoes plus socks, protective eyewear, and chemical-resistant apron. Applicators and other handlers must wear cover-all over long-sleeved shirt and long pants, waterproof gloves, and shoes plus socks. Any clothing or other absorbent materials that have been drenched or heavily contaminated with this product’s concentrate must be discarded. Do not re-use them. Keep and wash PPE separately from other laundry.
9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

Colour: Grayish yellow

Odour: Musty sulphur like

Density: 0.6376g/cm³

Melting point: 136°C (Decomposing before this degree)

Vapour Pressure: $1.33 \times 10^{-5}$ Pa

Flash point: 137.8°C (Tag open cup)

Solubility: 6.2mg/L in water, insoluble in most organic solvents.

Octanol/water partition coefficient: $< 22$ at 25°C (log Pow $\leq 1.34$)

Henry’s law constant: $< 2.23 \times 10^{-3}$ atm m³/(g.mol)⁻¹ at 25°C

10. STABILITY AND REACTIVITY

General: This material is stable under normal conditions.

Incompatible Materials: Acids and moisture (in storage).

Hazardous Decomposition: Decomposes with heat. Hazardous gasses / vapours produced are hydrogen sulfide, carbon disulfide and oxides of carbon, nitrogen and sulfur. Elevated temperature or free water promotes decomposition that may cause spontaneous combustion.

Hazardous Polymerization: Material is not known to polymerize.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

Oral toxicity: Low toxicity LD₅₀ = $>5,000$ mg/kg (rat)

Dermal toxicity: Low toxicity LD₅₀ = $>2,000$ mg/kg (rat)

Inhalation: Low toxicity LC₅₀ (4 hour) = $>5.14$ mg/L rat

Skin irritation: Non irritant (rabbit)

Eye irritation: Slightly irritant (rabbit)

Sensitisation: Sensitizer (guinea pig)

Chronic toxicity:

Mancozeb has been extensively tested on laboratory mammals and in test-tube systems. At high levels mancozeb affects the thyroid, liver, and nervous system in laboratory animals. The thyroid and liver effects are due to its metabolism in small amounts to ethylenethiourea (ETU), which interferes with thyroid hormone synthesis and induces stress-related liver growth. No evidence of mutagenic effects was obtained. Ethylenethiourea, a trace contaminant and breakdown product of mancozeb, has caused thyroid and pituitary tumours, which occurred at dose levels higher than likely human expose levels for the use of this product. ETU has caused birth defects in laboratory mammals at high dose levels that interfered with normal thyroid function.

12. ECOLOGICAL AND ECOTOXICOLOGICAL INFORMATION

Environmental Information

Environmental Toxicity:

Mallard duck, 10 day LD₅₀: $> 6400$ mg/kg;

Japanese quail, 10 day LD₅₀: 6400 mg/kg;

Mallard duck, Reproduction, NOAEL: 125 ppm;
Bobwhite quail, Reproduction, NOAEL: 500 ppm;
Rainbow trout (Salmo gairdneri), 48 Hour LC50: 1.9 mg/L;
Bluegill sunfish (Lepomis macrochirus), 48 Hour LC50: 1.63 mg/L;
Daphnia magna, 48 Hour EC50: 1.0 mg/L;
Sheephead minnow, mysid shrimp, oyster, 96 Hour EC or LC50: 0.01 to 2.01 mg/L;
Green algae (Selenastrum, Scenedesmus, Chlorella), 72-120 Hour EC50: 0.06 to 2.24 mg/L;
Honeybee, Contact LD50: > 100 ug/bee;
Honeybee, Ingestion LD50: > 100 ug/bee;
Earthworm, 14 Day LC50: > 299 ppm;
**The following results are based on ethylenethiourea (ETU).**
Rainbow trout (Salmo gairdneri), 96 Hour LC50: > 490 mg/L;
Guppy, 96 Hour LC50: 7500 mg/L;
Daphnia magna, 48 Hour EC50: 26 to 49 mg/L;
Overall low toxicity to birds and algae, medium toxicity to fish, aquatic organisms, bees and earthworms.

### 13. DISPOSAL CONSIDERATIONS

**Spills:** Remove source of heat, sparks, flame, impact, friction or electricity. Dyke spill. Prevent material from entering sewers, waterways, or low areas. Shovel or sweep up. Never return to container for re-use. Scoop into bags or boxes with plastic or aluminum shovel.

**Disposals:** Treatment, storage, transportation and disposal must be in accordance with applicable federal, state and local regulations. Do not flush to surface water or sanitary sewer system. Dispose of empty bag in an approved landfill.

### 14. TRANSPORT INFORMATION

Department of Transport (DOT): Classified as non Dangerous Goods for transport by Road and Rail.

International Air Transport Association (IATA) / International Maritime Organization (IMO): For marine and air transport the following Dangerous Goods classification is relevant:

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

**DG Class:** 9

**Identification Number:** UN 3077

**Packaging Group:** III

**Labels:** Marine Pollutant

**Hazchem:** 2X

### 15. REGULATORY INFORMATION

Labelling according WHO guidelines

**CLASS III, Slightly Hazardous, CAUTION**

**Risk phrase(s)**

R37: Irritating to respiratory system

R43: May cause sensitization by skin contact

R50/53: Very toxic to aquatic organisms may cause long-term adverse effects in the aquatic
environment.

**Safety phrase(s)**

S1/2: Keep locked up and out of reach of children.
S3/9/49: Keep only in the original container in a cool, well-ventilated place.
S13: Keep away from food, drink and animal feeding stuffs.
S20/21: When using do not eat, drink or smoke.
S23: Do not breathe sprays.
S24/25: Avoid contact with skin and eyes.
S29: Do not empty into drains.
S36/37/38: Wear suitable protective clothing, gloves and face protection.
S51: Use only in well-ventilated areas.
S60: This material and its container must be disposed of as hazardous waste.

### 16. OTHER INFORMATION

This MSDS summarizes our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact this company. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.