Understanding the Material Safety Data Sheet

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Awareness of the importance of safety has increased in the pesticide and pest control industry over the past several decades. This awareness has grown in response to activities by the government and the public as well as the news media, including coverage of major chemical accidents. The Occupational Safety and Health Administration (OSHA) in 1989 expanded its Hazard Communication Standard to cover all employees who could potentially be exposed to hazardous chemicals in their work areas — regardless of the place of employment or the nature of the work. The Hazard Communication Standard requires that chemical manufacturers and importers thoroughly evaluate chemicals that they produce and import to determine their hazard potential. If a chemical presents a hazard, a material safety data sheet (MSDS) must be developed to communicate the hazard potential to users.

A large amount of pesticide hazard information is generated in the course of fulfilling regulatory requirements for product registration. The Environmental Protection Agency requires approximately 120 tests, yielding primarily toxicological, environmental and physical property data, much of which can be used in the MSDS.

Chemical manufacturers are required by the Hazard Communication Standard to provide an MSDS to the purchaser of the product at the time of the first order and, thereafter, anytime the MSDS is significantly revised. The MSDS may be included with the pallet on which the product is shipped, or it may be submitted electronically or delivered by mail. As the pesticides are further distributed to satellite suppliers, dealers, or users, a copy of the MSDS must accompany their original orders. Thus, MSDS’s are disseminated along the distribution chain until they eventually reach businesses whose employees will be applying the products.

Although the MSDS is a necessary part of the Hazard Communication Standard, there is no specific format prescribed for the presentation of its contents. Therefore, MSDS’s from various manufacturers may differ dramatically in organization and appearance yet still present the required data. To help bring order to the MSDS format, the American National Standards Institute has published a voluntary standard prescribing the division of MSDS data into 16 sections. The sequence and titles of the sections as specified in the standard would create consistency from manufacturer to manufacturer. For data sheets prepared in accordance with the standard, the 16 section titles and their order of appearance is the same from manufacturer to manufacturer, but the amount of information within a given section is left to the discretion of each individual manufacturer.

This publication presents the 16 sections of the MSDS with a brief interpretation of the section contents.

Note: The examples that follow were taken from numerous MSDS’s from various manufacturers; it is important to note that these examples do not represent an actual MSDS for any one product.

### Section 1. Product and company identification

| **Product name:** Acme Termicide Concentrate |
| **Manufacturer:** Acme Agrosciences |
| P.O. Box 12345 |
| 9330 Chemical Way |
| Indianapolis, IN |
| **Telephone number for information:** (800) 123-4567 |
| **CHEMTREC:** (800) 424-9300 |

Product’s brand name.
Company’s identification and where to obtain information.
Non-emergency information regarding the product.
CHEMical TRansportation Emergency Center phone number for transportation emergencies.
Section 1. Product and company identification (Continued)

EPA registration number: 264-945
Date prepared: October 15, 1999
Code number: 000897
Chemical family: Pyrethroid pesticide
MSDS number: S000-10000

EPA assigns each registered product its own identity number. Date on which the MSDS was prepared. Identification number assigned by the manufacturer. One of the classifications of pesticides. Specific product identification assigned by the manufacturer.

Section 2. Composition/information on ingredients

Chemical ingredients
Active ingredient: propachlor, 2,3-diethyl........20%
Inert ingredient: attapulgite.................80%

CAS Reg. No.
propachlor 1919-16-7
attapulgite 8031-13-3

The active ingredient controls the pest. Inert ingredients can help make the product safer and easier to handle. Both the active and inert ingredients must be listed if they are known to contribute to the product's hazard potential unless they are a trade secret.

Active and inert ingredients are also identified by their Chemical Abstract Service (CAS) number.

Section 3. Hazards identification

Emergency overview: brown liquid, aromatic odor. Causes substantial but temporary eye injury. Harmful if absorbed through skin.

Potential health effects:
Acute eye: causes redness, irritation, tearing.
Acute skin: nonirritating.
Acute inhalation: may cause respiratory tract irritation.
Acute ingestion: may cause loss of coordination, burns to mouth and esophagus.

Chronic effects: This product contains ingredients that are considered to be probable or suspected human carcinogens (see Section 11 - Chronic).

This information is intended for emergency response personnel.

Acute effects occur immediately upon exposure to the substance through the eyes or skin or by inhalation or ingestion.

Chronic effects are those due to long-term exposure to the substance.

Section 4. First aid measures

Eyes: Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek immediate medical attention, preferably with an ophthalmologist.

Skin exposure: In case of contact, wash with plenty of soap and water. Seek medical attention if irritation develops or persists.

Inhalation: Remove the victim from immediate source of exposure and assure that the victim is breathing. If breathing is difficult, administer oxygen, if available. If victim is not breathing, administer CPR (cardiopulmonary resuscitation). Seek medical attention.

Ingestion: If victim is conscious and alert, give 2–3 glasses of water to drink and do not induce vomiting. Seek immediate medical attention.

Notes to physician: All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. Treat symptomatically. No specific antidote available. This material is an acid. The primary toxicity of this product is due to it irritant effects on mucous membranes.

What to do if the product gets into the eyes.

What to do if the product gets on the skin.

What to do if the product is breathed into the lungs.

What to do if the product is swallowed.

Specific instructions to the physician. Users should be familiar with where this is found on the MSDS so that in an emergency, the information can be given to the physician quickly. Any treatment listed in this section should not be attempted by a nonmedical person.
Section 5. Fire fighting measures

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flash point:</strong></td>
<td>63 degrees C/145 degrees F</td>
</tr>
<tr>
<td><strong>Lower explosive limit:</strong></td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Upper explosive limit:</strong></td>
<td>12.6%</td>
</tr>
<tr>
<td><strong>Extinguishing media:</strong></td>
<td>Recommended: foam, water, carbon dioxide, dry chemical.</td>
</tr>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td>Wear self-contained breathing apparatus (pressure-demand MSHA/NIOSH approved or equivalent) and full protective gear.</td>
</tr>
<tr>
<td><strong>Special procedures:</strong></td>
<td>Contain runoff. Remain upwind. Avoid breathing smoke. Use water spray to cool containers exposed to fire.</td>
</tr>
<tr>
<td><strong>Unusual fire and explosion hazards:</strong></td>
<td>Product will burn under fire conditions.</td>
</tr>
<tr>
<td><strong>Hazardous decomposition materials (under fire conditions):</strong></td>
<td>Hydrogen chloride, oxides of carbon.</td>
</tr>
</tbody>
</table>

Section 6. Accidental release measures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evacuation procedures and safety:</strong></td>
<td>Wear appropriate protective gear for the situation. See personal protection information in Section 8.</td>
</tr>
<tr>
<td><strong>Containment of spill:</strong></td>
<td>Stop leak if it can be done without risk. Dike spill using absorbent or impervious materials such as earth, sand or clay.</td>
</tr>
<tr>
<td><strong>Cleanup and disposal of spill:</strong></td>
<td>Absorb with vermiculite or other inert absorbent. Shovel up into an appropriate closed container (see Section 7: Handling and Storage). Decontaminate tools and equipment following cleanup.</td>
</tr>
<tr>
<td><strong>Environmental and regulatory reporting:</strong></td>
<td>If spilled on the ground, the affected area should be removed to a depth of 1-2 inches and placed in an appropriate container for disposal. Prevent material from entering public sewer system or any waterways. Spills may be reported to the National Response Center (800-424-8802) and to state and/or local agencies.</td>
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</tbody>
</table>

Section 7. Handling and storage

<table>
<thead>
<tr>
<th>Property</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum/maximum storage temperatures:</strong></td>
<td>0 to 50 degrees C (32 to 122 degrees F)</td>
</tr>
<tr>
<td><strong>Handling:</strong></td>
<td>Do not breathe vapors and mists. Do not get on skin or in eyes. Do not ingest. Use handling, storage and disposal procedures that will prevent contamination of water, food or feed. Avoid freezing. If freezing occurs, thaw and remix before using.</td>
</tr>
<tr>
<td><strong>Storage:</strong></td>
<td>Store in an area that is away from ignition sources.</td>
</tr>
</tbody>
</table>

Section 8. Exposure controls/personal protection

<table>
<thead>
<tr>
<th>Activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ingestion:</strong></td>
<td>Prevent eating, drinking, tobacco usage and cosmetic application in areas where there is a potential for exposure to the material. Always wash thoroughly after handling.</td>
</tr>
<tr>
<td><strong>Eye contact:</strong></td>
<td>To avoid eye contact, wear safety glasses with side shields or chemical goggles.</td>
</tr>
<tr>
<td><strong>Protective measures to reduce the likelihood of swallowing:</strong></td>
<td>Prevent eating, drinking, tobacco usage and cosmetic application in areas where there is a potential for exposure to the material. Always wash thoroughly after handling.</td>
</tr>
<tr>
<td><strong>Protective measures to reduce the likelihood of the pesticide getting in the eyes:</strong></td>
<td>To avoid eye contact, wear safety glasses with side shields or chemical goggles.</td>
</tr>
</tbody>
</table>
Section 8. Exposure controls/personal protection (Continued)

<table>
<thead>
<tr>
<th>Skin contact: To avoid skin contact, wear rubber gloves, rubber boots, long-sleeved shirt, long pants and a head covering.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory protection:</strong> To avoid breathing dust, use a particulate filter, NIOSH-approved per 42 CFR Part 84. Select N or R or P type as appropriate for the oil characteristics of any other air contaminants present. Filter efficiency may range from 95% to 99.7% as appropriate for the size distribution of dusts present.</td>
</tr>
<tr>
<td><strong>Engineering controls:</strong> If needed, use local exhaust to keep exposures to a minimum.</td>
</tr>
<tr>
<td><strong>Exposure guidelines:</strong> Benomyl: PEL (OSHA): 15 mg/m³, total dust, 8 hr. TLV (ACGIH): 0.84 ppm, 10 mg/m³, 8 hr.</td>
</tr>
</tbody>
</table>

Protective measures to reduce the possibility of getting the pesticide on the skin.

The type of respirator, if any, needed when handling this product.

Procedures used to maintain airborne levels below TLV (Threshold Limit Value) or PEL (Permissible Exposure Limit).

PEL and TLV identify the concentration of chemical in the air, below which workers would not be expected to experience health problems during a 40-hour work week.

Section 9. Physical and chemical properties

| Color: Yellow liquid. |
| Odor characteristic: Kerosene odor. |
| pH: 4.1 Aqueous solution. |
| Specific gravity (Water = 1): 0.95 |
| Vapor density (Air = 1): 4.8 |
| Vapor pressure: 3 mm Hg @ 25 degrees C/77 degrees F |
| Boiling point: 176 degrees C (349 degrees F) |
| Solubility in water: 0.1 ppm |

Describes the physical appearance of the chemical.

Describes the product odor for detection purposes.

pH values from 0 to 2 and from 12 to 14 are usually corrosive to skin and eyes. Also may be helpful in neutralizing a chemical spill.

The weight of the chemical compared to the weight of an equal volume of water.

Weight of the chemical's vapor compared to air. Vapors with weight values less than 1, rise. Those with weight values greater than 1, sink and concentrate.

Measurement of the potential of the chemical to convert to a gaseous form.

Temperature at which a liquid becomes a vapor.

A measurement of the amount of material that will dissolve in water. Materials with a value of 100 ppm and less are considered to be relatively insoluble, while those with values greater than 1,000 ppm are considered very soluble.

Section 10. Stability and reactivity

| Chemical stability: Stable at normal temperatures and storage conditions. |
| Hazardous polymerization: Will not occur. |
| Conditions to avoid: Avoid freezing temperatures. |
| Chemical incompatibility: Oxidizing agents. |
| Hazardous decomposition products: HCl, HF, NO₂ during combustion. |

Usually general terms to describe the chemical's stability. At times, temperatures will be listed at which the chemical becomes unstable.

This is a statement that states if the product will react dangerously with itself to form other products.

Describes conditions under which the product may damage the product, the container or cause a hazardous condition.

Describes other materials which may react with the product.

A list of by-products that are formed when the product burns or is subjected to other conditions.

Section 11. Toxicological information

| Acute Data |
| Eye irritation: Rabbit: substantial irritation. |
| Skin irritation: Rabbit: severe irritation |

Consequences of short-term exposure to eyes.

Consequences of short-term exposure to skin.
Section 11. Toxicological information (Continued)

**Oral LD<sub>50</sub>:** Rat: 3600 mg/kg

**Dermal LD<sub>50</sub>:** Rabbit: >5000 mg/kg

**Inhalation LC<sub>50</sub>:** Rabbit: 11 mg/L for 4 hr

**Skin sensitization:** Guinea pig: sensitizing

**CHRONIC DATA**

**Chronic toxicity studies:** Liver (alteration and enlargement) and thyroid effects (hormone imbalances) at high dose levels (rats); decreased body weight gains.

**Mutagenicity data:** This product does not pose a mutagenic hazard.

**Reproductive/teratology data:** No birth defects were noted in rats and rabbits given dithiopyr technical orally during pregnancy. No effects were seen on the ability of male or female rats to reproduce when fed dithiopyr technical for two successive generations.

**Carcinogenicity data:** Benign thyroid tumors (species-specific). The U.S. EPA lists prodiamine as a possible human carcinogen based on limited evidence from animal studies.

Section 12. Ecological information

**Eco-acute toxicity**
- Bluegill sunfish, 96-hour LC<sub>50</sub>: 0.47 mg/l
- Rainbow trout, 96-hour LC<sub>50</sub>: 0.46 mg/l
- Daphnia magna, 48-hour LC<sub>50</sub>: 5.2 mg/l
- Bobwhite quail, 5-day dietary LC<sub>50</sub>: >5620 ppm
- Mallard duck, 5-day dietary LC<sub>50</sub>: >5620 ppm
- Bobwhite quail, Acute oral LC<sub>50</sub>: >2250 mg/kg
- Honeybee, LD<sub>50</sub>: 81 μg/bee

**Environmental fate**
- Photolysis: Unstable, half-life less than 1 hour.
- Hydrolysis: Stable soil half-life: 2 months.

Section 13. Disposal considerations

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

Section 14. Transportation information

**Proper shipping name:** Triazine pesticide, liquid, toxic (cyanazine).

**Hazard class:** Class 9.

**UN No.:** UN 3082

**Special information:** Marine pollutant.

Toxicity of short-term exposure from ingestion. The LD<sub>50</sub> is the dose level that is expected to cause the death of 50% of the test animals.

Toxicity by absorption through the skin.

Toxicity from breathing dusts, fumes or vapors. The LC<sub>50</sub> is the concentration of dust, fume or mist that is expected to kill 50% of the test animals.

An allergic reaction on tissue after repeated exposure.

Adverse health effects resulting from long-term exposure to a chemical, or long-term effects from short exposures.

Effects of exposure to a substance that may change the genetic material in a living cell.

Effects of exposure that may affect the ability to reproduce viable offspring or cause birth defects.

The ability of a substance to cause cancer.

This section describes indicator species that were used in toxicity testing.

The breakdown processes of a chemical when exposed to various environmental elements. Exposure to sunlight. Exposure to water.

Directions and limitations for disposal of the material.

The official shipping name and description that should appear on U.S. Department of Transportation (DOT) shipping papers. DOT recognizes 9 classes of hazardous materials. Typically, the lower the number, the more hazardous the material.

The number assigned for identification by the United Nations (UN) convention.

Special provisions for a particular hazardous material.
### Section 14. Transportation information (Continued)

**Packing group:** III.

### Section 15. Regulatory information

**Workplace classification:** This product is considered hazardous under the OSHA Hazard Communication Standard (29 CFR 1910.1200).

**SARA Title 3:** Section 311/312 Categorizations (40 CFR 372): This product is a hazardous chemical under 29 CFR 1910.1200, and is categorized as an immediate and delayed health, and flammability physical hazard.

**TSCA status:** Exempt from TSCA.

**RCRA classification:** Reactive

**CERCLA reportable quantity:** This material contains no hazardous or extremely hazardous substances as defined by CERCLA.

### Section 16. Other information

**National Fire Protection Association (NFPA) ratings:**

Health = 2; Flammability = 1; Reactivity = 0.

**Issue date:** 1/2/92

**Revised date:** 2/8/99

**Supersedes:** 2/3/99

**Responsibility for MSDS:** Acme Agrosciences

**Address:** P.O. Box 12345

9330 Chemical Way

Indianapolis, IN

**Telephone:** 800-555-1234

Specifies one or more packing groups for the material based on the hazard of great (I), medium (II), or minor (III) significance. May assist in selecting the proper packaging materials and labels.

The Occupational Safety and Health Administration's interpretation of the product's hazard to workers.

Superfund Amendment and Reauthorization Act (SARA) category. SARA requires reporting any spill of any hazardous substance.

Toxic Substances Control Act statement regarding its regulation. This law covers the production and distribution of commercial and industrial chemicals in the United States.


Comprehensive Environmental Response, Compensation and Liability Act's classification. CERCLA provides EPA authority to respond to releases of hazardous substances.

NFPA's scale: 0 = least; 1 = slight; 2 = moderate; 3 = high; 4 = extreme. Classification and properties of hazardous chemical data.

Original MSDS publishing date.

Date that MSDS was amended.

Date of previous MSDS.