Material Safety Data Sheet (MSDS)

# Section 1: Identification

**Product identifier used on the label:** *Clearly state the name of the product as it appears on its label.*

**Other means of identification:** *Provide synonyms or other common names for the product.*

**Recommended use of the chemical and restrictions on use:** *Specify intended uses and any restrictions.*

**Name, address, and telephone number of the manufacturer, importer, or other responsible party:** *Include full contact information.*

**Emergency phone number:** *Provide a number for immediate assistance in case of emergencies.*

**Example**:

**Product Name:** Ethanol 99%
**Synonyms:** Alcohol, Ethyl Alcohol
**Recommended Use:** Solvent for industrial applications. Restrictions: Do not use near open flames.
**Manufacturer:** XYZ Chemicals, 123 Industrial Rd, Cityville, USA. Emergency Contact: +1-800-555-1234

# Section 2: Hazard Identification

**Classification of the chemical:** *Identify the hazard category (e.g., flammable, corrosive).*

**Signal word:** *(e.g., Danger or Warning).*

**Hazard statements:**

**Precautionary statements:** *Include terms like "Danger" or "Warning" and specific hazard warnings.*

**Pictograms:** *Use standard symbols to indicate hazards.*



**Description of other hazards:** *Mention any additional risks not covered above.*

**Example**:

**Hazard Classification:** Flammable liquid, Category 2
**Signal Word:** Danger
**Hazard Statements:** Highly flammable liquid and vapor. Causes skin irritation.
**Precautionary Statements:** Keep away from heat/sparks/open flames. Wear protective gloves.



# Section 3: Composition/Information on Ingredients

|  |  |  |  |
| --- | --- | --- | --- |
| **Chemical Name** | **Synonyms** | **CAS No.** | **Conc.** |
| *Provide the official chemical name.* | *List common names and synonyms for the material.* | *CAS number and other unique identifiers* | *Concentration (exact percentage) for each component* |

**Example:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Chemical Name** | **Synonyms** | **CAS No.** | **Conc.** |
| *Ethanol* | *Alcohol, Ethyl Alcohol* | *CAS# 64-17-5* | *99%* |

# Section 4: First-Aid Measures

**Necessary measures:** *Describe steps for inhalation, skin contact, eye exposure, and ingestion.*

**Symptoms/effects:** *Outline both immediate and delayed symptoms.*

**Special treatment:** *Indicate any unique medical attention requirements.*

**Example**:

**Skin Contact:** Wash with soap and water. Seek medical advice if irritation persists.
**Eye Contact:** Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do.

# Section 5: Fire-Fighting Measures

**Suitable extinguishing media:** *Specify appropriate extinguishing agents.*

**Specific hazards:** *Describe dangers related to combustion.*

**Protective equipment:** *Detail necessary gear for fire-fighting personnel.*

# Section 6: Accidental Release Measures

**Example**:

**Suitable Extinguishing Media:** Dry chemical, foam, or carbon dioxide (CO2).
**Special Hazards:** Emits toxic fumes when burned.

**Personal precautions:** *State required protective equipment and emergency protocols.*

**Containment and cleanup methods:** *Provide instructions for managing and removing spills.*

**Example**:

Contain spill with inert material like sand. Avoid discharge into drains. Use PPE such as gloves and goggles.

# Section 7: Handling and Storage

**Precautions for safe handling:** *Explain how to handle the material safely.*

**Storage requirements:** *Include conditions for safe and stable storage.*

**Example**:

**Handling:** Avoid inhaling vapors. Use in a well-ventilated area.
**Storage:** Store in tightly sealed containers in a cool, dry place away from ignition sources.

# Section 8: Exposure Controls/Personal Protection

**Exposure limits:** *Note regulatory or recommended limits.*

**Engineering controls:** *Provide suggestions for workspace ventilation.*

**Personal protection:** *List necessary protective equipment such as gloves, goggles, and masks.*

**Example**:

**Gloves:** Chemical-resistant (e.g., nitrile).
**Respiratory Protection:** Use a NIOSH-approved respirator if ventilation is inadequate.

# Section 9: Physical and Chemical Properties

**Form:** *The physical state and appearance of the material (e.g., solid, liquid, gas, color).*

**Odor:**  *The smell of the material, if any, or its absence.*

**Odor threshold:** *The lowest concentration of the substance at which its odor is perceptible.*

**pH:** *Measure of the material's acidity or alkalinity, often for aqueous solutions.*

**Melting point/melting range:** *The temperature or temperature range at which the material transitions from solid to liquid.*

**Boiling point/boiling range:** *The temperature or range at which the material transitions from liquid to gas.*

**Flash point:** *The lowest temperature at which the material's vapors ignite in the presence of an ignition source.*

**Evaporation rate:** *The rate at which the material changes from liquid to vapor compared to a reference material (e.g., water or ethyl ether).*

**Flammability:** *Indicates whether the material is flammable and its susceptibility to ignition.*

**Upper/lower flammability or explosive limits:** *The concentration range of the material in the air that will ignite or explode.*

**Auto ignition temperature:** *The temperature at which the material spontaneously ignites without an external ignition source.*

**Danger of explosion:** *Potential for the material to explode under certain conditions, such as confinement or pressure.*

**Vapor pressure:** *The pressure exerted by the vapor of the material at a given temperature.*

**Vapor density:** *The density of the material's vapor compared to air (air = 1).*

**Relative density:** *The ratio of the material's density to that of water at the same temperature.*

**Solubility in/Miscibility with water:** *Indicates whether the material dissolves or mixes uniformly with water.*

**Material Example: Ethanol (99%)**

**Form**: Clear, colorless liquid.
**Odor**: Mild, characteristic alcohol odor.
**Odor Threshold**: 10 ppm.
**pH**: Not applicable (pure liquid).
**Melting Point/Melting Range**: -114°C.
**Boiling Point/Boiling Range**: 78.5°C.
**Flash Point**: 12°C (closed cup).
**Evaporation Rate**: 2.3 (compared to butyl acetate = 1).
**Flammability**: Highly flammable liquid and vapor.
**Upper/Lower Flammability or Explosive Limits**: Lower limit: 3.3%, Upper limit: 19%.
**Auto Ignition Temperature**: 363°C.
**Danger of Explosion**: Risk of explosion when exposed to heat, sparks, or open flames, especially in confined spaces.
**Vapor Pressure**: 59 mmHg at 20°C.
**Vapor Density**: 1.59 (heavier than air).
**Relative Density**: 0.79 at 20°C.
**Solubility in/Miscibility with Water**: Completely miscible.

# Section 10: Stability and Reactivity

**Reactivity**: *Describes how likely the material is to react under normal conditions or when exposed to specific conditions (e.g., heat or pressure).*

**Chemical Stability**: Indicates whether the material remains stable under normal handling and storage conditions.

**Conditions to Avoid**: Specific scenarios that might lead to instability or hazardous reactions (e.g., heat, moisture, static discharge).

**Incompatible Materials**: Lists substances that could cause a dangerous reaction when in contact with the material.

**Hazardous Decomposition Products**: Identifies toxic substances that may form when the material decomposes.

**Material Example: Ethanol**

**Reactivity**: Reacts with oxidizers.
**Chemical Stability**: Stable under normal conditions.
**Conditions to Avoid**: Avoid heat and sparks.
**Incompatible Materials**: Strong oxidizing agents.
**Hazardous Decomposition Products**: Carbon monoxide, carbon dioxide.

# Section 11: Toxicological Information

**Acute Toxicity**: Indicates harmful effects after a single or short-term exposure.

**Potential Routes of Exposure/Potential Health Effects**:

* **Skin**: Describes effects on skin contact.
* **Eye**: Details the impact of exposure to eyes.
* **Inhalation**: Describes effects from breathing in the material.
* **Ingestion**: Indicates health effects from swallowing the material.

**Carcinogenic Effects**: States if the material is known to cause cancer.

**Mutagenic Effects**: Describes if the material may cause genetic mutations.

**Reproductive Toxicity**: Indicates whether the material affects fertility or fetal development.

**Sensitization**: States if the material causes allergic reactions.

**Target Organs**: Identifies organs affected by exposure to the material.

**Material Example: Ethanol**

**Acute Toxicity**: Oral LD50 (rat): 7,060 mg/kg.
**Skin**: Causes mild irritation.
**Eye**: Causes severe irritation.
**Inhalation**: Can cause dizziness.
**Ingestion**: May cause nausea.
**Carcinogenic Effects**: Not classified as carcinogenic.
**Mutagenic Effects**: Not mutagenic.
**Reproductive Toxicity**: No evidence of toxicity.
**Sensitization**: Not a sensitizer.
**Target Organs**: Liver, central nervous system.

# Section 12: Ecological Information (non-mandatory)

**Ecotoxicity**: Describes how the material impacts aquatic and terrestrial organisms.

**Mobility**: Indicates the likelihood of the material spreading in soil or water.

**Biodegradation**: Describes how easily the material breaks down in the environment.

**Bioaccumulation**: Indicates whether the material accumulates in living organisms.

**Material Example: Ethanol**

**Ecotoxicity**: LC50 (fish): 13,000 mg/L (96 hours).
**Mobility**: High in water and soil.
**Biodegradation**: Rapidly biodegradable.
**Bioaccumulation**: Low potential.

# Section 13: Disposal Considerations (non-mandatory)

**Description of Waste Residues and Disposal Methods**: Provides safe disposal recommendations, including for contaminated packaging.

**Material Example: Ethanol**

Dispose of unused ethanol at a licensed hazardous waste facility. Clean empty containers before recycling or disposal.

# Section 14: Transport Information (non-mandatory)

**Hazard Class**: Classifies the material for transport safety.

**Land Transport ADR/RID (cross-border)**: Guidelines for transporting on land.

**ADR/RID Class**: Defines transport safety class.

**Maritime Transport IMDG**: Indicates marine transport classification.

**Air Transport ICAO-TI and IATA-DGR**: Describes air transport classification.

**Material Example: Ethanol**

**Hazard Class**: 3 (flammable liquid).
**Land Transport ADR/RID**: UN1170, Ethanol.
**ADR/RID Class**: Class 3.
**Maritime Transport IMDG**: IMDG Class 3, Packing Group II.
**Air Transport ICAO-TI and IATA-DGR**: UN1170, Class 3, Packing Group II.

# Section 15: Regulatory Information (non-mandatory)

**Safety, Health, and Environmental Regulations**: Indicates compliance with regional or national regulations.

**SARA Section 355**: Indicates listing under extremely hazardous substances.

**SARA Section 313**: Specifies if listed as a toxic chemical.

**Clean Air Act**: Identifies hazardous air pollutants.

**TSCA**: Indicates listing under the Toxic Substances Control Act.

**Material Example: Ethanol**

**SARA Section 355**: Not listed.
**SARA Section 313**: Not listed.
**Clean Air Act**: Not a listed pollutant.
**TSCA**: Listed.

# Section 16: Other Information

The date of preparation of the SDS or the last change to it