

citric acid anhydrous material safety data sheet

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Citric Acid Anhydrous Material Safety Data Sheet: A Comprehensive Guide

Citric acid is one of the most widely used food additives, cleaning agents, and industrial reagents. When it comes in its anhydrous form—free of water—its properties change subtly, making it essential to handle it with care. For anyone working in a laboratory, a manufacturing plant, or even a household setting, having a clear understanding of the **citric acid anhydrous material safety data sheet** (SDS) is critical. This document provides a systematic overview of the hazards, precautions, and best practices associated with anhydrous citric acid, ensuring that you can work safely while complying with regulatory standards.

What Is Citric Acid Anhydrous?

Citric acid (C₆H₈O₇) is a weak organic acid naturally found in citrus fruits. In its anhydrous state, the compound has no water molecules bound to it, resulting in a more concentrated, crystalline powder. The lack of water makes it highly hygroscopic; it readily absorbs moisture from the air, which can alter its physical properties and reactivity.

Industrially, anhydrous citric acid is employed in:

- Food and beverage preservation
- Pharmaceutical formulations
- Cleaning solutions and detergents
- Electroplating baths
- Cosmetic products

Because of its widespread use, the safety data sheet for this material is a key resource for understanding how to handle it responsibly.

Why the Safety Data Sheet Matters

The safety data sheet, commonly referred to as SDS or MSDS (Material Safety Data Sheet), is a legally mandated document that provides detailed information about a chemical's hazards and safe handling procedures. For anhydrous citric acid, the SDS covers:

1. Identification of the substance and its recommended uses
2. Hazard classification and labeling
3. Composition and ingredient details
4. First-aid measures and emergency response
5. Firefighting and spill response guidelines
6. Safe handling, storage, and disposal instructions
7. Regulatory and transportation information

Having a thorough grasp of this information can prevent accidents, reduce exposure risks, and ensure compliance with occupational safety regulations such as OSHA, REACH, and GHS.

Key Sections of the Citric Acid Anhydrous SDS

Below we break down each section of the SDS, highlighting the most relevant details for anhydrous citric acid. Understanding these sections will help you interpret the document correctly and apply the necessary precautions.

1. Identification

This section lists the chemical's name, recommended uses, and the supplier's details. For anhydrous citric acid, typical identifiers include:

- Trade Name: Citric Acid (Anhydrous)
- CAS Number: 77-92-12
- Synonyms: 2,3,4-Trimethylpentane-1,2,3-tricarboxylic acid, 2,3,4-Trimethylpentanedioic acid, etc.

Always verify the product label and SDS to ensure you are working with the correct material.

2. Hazard Identification

Citric acid anhydrous is classified as a low hazard substance under GHS but can cause irritation. Key points include:

- Eye irritation: May cause temporary redness and discomfort.
- Skin irritation: Can lead to mild dermatitis upon prolonged contact.
- Inhalation: Dust can irritate the respiratory tract.
- Flammability: Not flammable; no fire hazard.
- Environmental hazard: Not classified as hazardous to the environment, but high concentrations can affect aquatic life.

The SDS will provide a hazard pictogram and precautionary statements to help you recognize potential risks at a glance.

3. Composition/Information on Ingredients

This part details the concentration of each component. For pure anhydrous citric acid, the SDS will list 100% citric acid with no impurities. If the product contains stabilizers or fillers, those will also be listed.

4. First-Aid Measures

Effective first-aid procedures are essential. The SDS outlines steps such as:

- Eye contact: Rinse with water for at least 15 minutes and seek medical attention.
- Skin contact: Wash with soap and water, then apply a mild moisturizer.
- Inhalation: Move to fresh air and, if symptoms persist, consult a healthcare professional.
- Ingestion: Rinse mouth and drink water; seek medical help if symptoms develop.

Always keep the first-aid information easily accessible near the storage or work area.

5. Firefighting Measures

Although anhydrous citric acid is not flammable, it can act as an oxidizer under extreme conditions. Firefighting advice includes:

- Use water spray or foam to extinguish accidental fires.
- Avoid using dry chemical extinguishers that might cause dust explosions.
- Ensure proper ventilation to remove any toxic fumes.

6. Accidental Release Measures

Spills should be handled carefully to prevent exposure. Key steps involve:

- Ventilate the area to disperse dust.

- Use inert absorbent materials (e.g., dry sand or paper towels) to contain the spill.
- Wear appropriate PPE (gloves, goggles).
- Dispose of waste in accordance with local regulations.

7. Handling and Storage

Safe handling and storage are vital to maintain product integrity and safety:

- Store in a cool, dry place away from moisture.
- Avoid direct sunlight and heat sources.
- Use sealed containers to prevent dust formation.
- Keep away from incompatible chemicals such as strong oxidizers.

8. Exposure Controls/Personal Protection

Proper PPE reduces exposure risk:

- Gloves: Nitrile or latex gloves to prevent skin irritation.
- Eye protection: Safety goggles or face shields.
- Respiratory protection: Dust masks if working in poorly ventilated areas.
- Ventilation: Use local exhaust ventilation or fume hoods.

9. Physical and Chemical Properties

Key data points include:

- Appearance: White crystalline powder
- Odor: Odorless
- Melting point: 153 °C (or 154–156 °C, depending on purity)
- Boiling point: Decomposes before boiling
- Solubility: Highly soluble in water (approx. 1 g per 0.8 mL at 20 °C)
- Density: 1.66 g/cm³ (anhydrous)

10. Stability and Reactivity

Anhydrous citric acid is chemically stable under normal conditions but can react with:

- Strong oxidizers (e.g., potassium permanganate)
- Strong bases (e.g., sodium hydroxide) forming salts.
- High temperatures leading to decomposition.

11. Toxicological Information

Citric acid is generally recognized as safe (GRAS) at typical exposure levels. However, high concentrations can cause:

- Dermal irritation and sensitization.
- Respiratory tract irritation.
- Acute toxicity: LD50 in rats > 2000 mg/kg (oral).

12. Ecological Information

While citric acid is biodegradable and not persistent in the environment, large quantities can lower pH levels in aquatic ecosystems, potentially affecting fish and invertebrates.

13. Disposal Considerations

Disposal should follow local environmental regulations:

- Neutralize with a mild base before disposal.
- Do not pour into drains if large quantities are present.
- Use designated chemical waste containers.

14. Transport Information

Citric acid anhydrous is classified as a non-hazardous material for transport. Nonetheless, it should be packed in a secure container to prevent spillage.

15. Regulatory Information

Key regulatory references include:

- OSHA Hazard Communication Standard (29 CFR 1910.1200)
- EU REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals)
- Globally Harmonized System (GHS) of Classification and Labelling of Chemicals

16. Other Information

Additional data may include:

- Revision date of the SDS
- Contact details for the supplier's technical support
- Recommendations for emergency response teams

Practical Safety Tips for Labs and Industry

Having a solid grasp of the SDS is only part of the safety equation. Here are actionable steps you can implement to minimize risks when working with anhydrous citric acid.

1. Use Proper Storage Bins

Store the powder in airtight, moisture-resistant containers. Label each container with the SDS number and hazard pictograms. Keep storage areas dry and well-ventilated.

2. Maintain a Clean Work Environment

Dust accumulation can increase inhalation exposure. Regularly sweep or vacuum the work area and use a dust mask or respirator when handling large quantities.

3. Implement a Spill Response Plan

Train all personnel

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