

Detailed Specifications of Silver Liquid Mercury

1. Introduction

Silver Liquid Mercury, also known as elemental mercury (Hg, atomic number 80), is a unique heavy metal used in industrial applications such as gold mining, analytical chemistry, and scientific instruments. Due to its toxicity and environmental hazards, it is subject to strict regulations under frameworks like the Minamata Convention, EU REACH (EC No 1907/2006), and EU CLP (EC No 1272/2008). This document outlines the chemical and physical properties, purity standards, packaging, and storage requirements for Silver Liquid Mercury, ensuring compliance and safety for industrial buyers.

2. Chemical and Physical Properties

Silver Liquid Mercury possesses distinctive properties that make it valuable for specialized applications, particularly in gold amalgamation and precision instruments.

Chemical Formula: Hg

Molecular Weight: 200.61 g/mol

Appearance: Shiny, silver-white liquid with a mirror-like luster, free of mechanical impurities (e.g., sand, ash).

Physical State: Liquid at standard temperature and pressure (25°C, 1 atm), one of only two elements (alongside bromine) liquid under these conditions.

Density:

Liquid: 13.546 -20.5 g/cm³ at 25°C

Solid: 14.184 g/cm³ (upon freezing, volume decreases by 3.59%)

Specific Gravity: 13.59 (water = 1) at 4°C

Melting Point: -38.89°C (-37.80°F), the lowest among stable metals

Boiling Point: 356.72°C (674.10°F)

Vapor Pressure: 0.002 mm Hg at 25°C, producing trace amounts of toxic, odorless vapor

Vapor Density: 7.0 (air = 1)

Viscosity: 15.5 mPa·s at 25°C

Solubility:

Insoluble in water, hydrochloric acid, and dilute sulfuric acid

Soluble in nitric acid, aqua regia, and hot concentrated sulfuric acid

Thermal Conductivity: Poor conductor of heat compared to other metals, but a fair conductor of electricity

Coefficient of Volume Expansion:

181.59 × 10⁻⁶ per °C at 0°C

181.71 × 10⁻⁶ per °C at 20°C
182.50 × 10⁻⁶ per °C at 100°C

Reactivity:

Does not react with most acids (e.g., dilute sulfuric acid)
Dissolves in oxidizing acids (e.g., concentrated sulfuric acid, nitric acid, aqua regia) to form sulfate, nitrate, or chloride compounds
Reacts with atmospheric hydrogen sulfide and solid sulfur flakes (used in spill kits)
Forms amalgams with metals like gold, silver, and aluminum, but not iron, platinum, or certain transition metals (e.g., manganese, copper, zinc)

CAS Number: 7439-97-6

EINECS Number: 231-106-7

Note: Mercury's volatility and toxicity require strict handling protocols, including PPE (e.g., butyl rubber gloves, respirators) and ventilation to limit exposure to < 0.05 mg/m³ (OSHA PEL).

3. Purity Standards

Silver Liquid Mercury is available in various purity grades, tailored to specific industrial and research applications. The following grades are commonly offered by reputable suppliers:

Lab Grade:

Purity: 99.99%

Applications: Suitable for educational research and training due to potential impurities not meeting stringent industrial standards.

Impurities: May contain trace contaminants (e.g., < 0.01% heavy metals).

Prime Virgin Mercury:

Purity: 99.999%

Applications: Used in high-precision applications such as gold mining (amalgamation), analytical chemistry, and scientific instruments (e.g., barometers, thermometers).

Impurities: Iron < 0.0002%, lead < 0.0004%, total burning residue < 0.001%.

Quadruple Distilled ACS Grade:

Purity: 99.9995%

Applications: Ideal for ultra-sensitive applications requiring minimal contaminants, such as advanced research and calibration equipment.

Impurities: Near-zero detectable contaminants, verified by ICP-MS.

Executive Standard: Complies with GB913-85 (Chinese standard for high-purity mercury), ensuring consistency for industrial use.

Note: For gold mining, 99.999% purity is preferred to maximize amalgamation efficiency and minimize environmental contamination. Suppliers must provide Certificates of Analysis (CoA) to verify purity, especially given mercury's restrictions under the Minamata Convention.

4. Packaging and Storage

Due to Silver Liquid Mercury's toxicity and volatility, strict packaging and storage protocols are essential to ensure safety, regulatory compliance, and product integrity.

4.1 Packaging

Containers:

Supplied in sealed steel or iron cylinders (typically 34.5 kg net weight) or polypropylene bottles (e.g., 1 kg, 100 g, 250 g, 500 g) to prevent leaks and contamination. Iron containers are preferred, as mercury does not form amalgams with iron, reducing corrosion risks.

Standards:

Containers are UN-certified for hazardous materials (UN 2809), labeled per EU CLP Regulation (EC No 1272/2008) with "Toxic" (GHS06) and "Environmentally Hazardous" (GHS09) pictograms. Tamper-evident seals and serialized tracking ensure security during transport.

Transport Compliance:

Adheres to Basel Convention for transboundary hazardous material shipments. Packaged with spill kits (e.g., sulfur flakes) for emergency containment.

4.2 Storage Conditions

Temperature: Store at 5–25°C to minimize vapor release (vapor pressure: 0.002 mm Hg at 25°C).

Ventilation: Store in secure, well-ventilated areas to prevent vapor accumulation, using fume hoods or exhaust systems.

Container Requirements: Use corrosion-resistant materials (e.g., iron, stainless steel). Avoid aluminum or other metals that form amalgams.

Safety Protocols:

Equip storage areas with spill containment trays and mercury-specific sensors. Ensure compliance with OSHA (USA) and EU-OSHA exposure limits (< 0.05 mg/m³). Provide Safety Data Sheets (SDS) with each shipment, detailing handling and emergency procedures.

5. Applications in Gold Mining

Silver Liquid Mercury has historically been used in gold mining for amalgamation, forming mercury-gold amalgams to extract gold from ores. Key specifications for mining include:

Purity: 99.999% to ensure efficient amalgamation and minimal impurities.

Process: Mercury is mixed with gold-bearing ore, forming an amalgam that is heated to vaporize mercury, leaving pure gold. Modern use is limited due to environmental concerns.

6. Safety and Regulatory Compliance

Toxicity: Mercury is highly toxic, causing neurological and kidney damage (inhalation, skin contact). Exposure limits: 0.05 mg/m³ (OSHA), 0.02 mg/m³ (EU).

Handling:

Use butyl rubber gloves, full-face respirators (organic vapor cartridges), and chemical-resistant coveralls.

Process in fume hoods with air monitoring (<0.5 mg/m³).

Spill Management: Use sulfur flakes or commercial spill kits to neutralize spills, followed by professional disposal per EPA or EU Directive 2008/98/EC.

Regulations:

EU REACH (EC No 1907/2006): Mandates registration and safe handling protocols.

EU CLP (EC No 1272/2008): Requires hazard labeling and SDS provision.

Basel Convention: Governs transboundary transport, requiring UN-certified packaging.

7. Conclusion

Silver Liquid Mercury (Hg) is a critical industrial chemical with unique properties, including a high density (13.546 g/cm³), low melting point (-38.89°C), and ability to form amalgams, making it valuable for gold mining and scientific applications. Its high purity (99.999–99.9995%) ensures performance, but strict packaging (UN-certified steel/iron cylinders), storage (5–25°C, ventilated), and regulatory compliance (Minamata, REACH, CLP) are essential due to its toxicity. Buyers must source from trusted, ISO-certified suppliers like <https://uctr-gmbh.de> to ensure quality and safety.

For inquiries, contact reputable suppliers like Useful Chemicals (UE Chemicals) at info@useful-chemicals.com or WhatsApp: +66 951 690 848, or visit <https://useful-chemicals.com/> for high-purity Silver Liquid Mercury.