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**School Materials Safety Manual:**  
**No. 296 Ammonium Molybdate (VI)**  
**Tetrahydrate**  
**Issued 2/92**

## ♦ SECTION 1 INTRODUCTION

**Material** Ammonium Molybdate; technical, CP (chemically pure), reagent contains 85%  $\text{MoO}_3$  (molybdic acid).

**Synonyms** ammonium heptamolybdate; ammonium molybdate (VI) tetrahydrate; ammonium paramolybdate; molybdate, hexammonium (9CI); molybdic acid 85%

**Chemical Formula**  $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$

**CAS Number** 12027-67-7

**DOT Classification** Not listed as a Hazardous Material for Transportation (49 CFR 172.101)

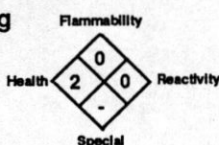
**EPA Classification** Not listed as a RCRA Hazardous Waste (40 CFR 261.33), a CERCLA Hazardous Substance (40 CFR 302.4), a SARA Extremely Hazardous Substance (40 CFR 355), or a SARA Toxic Chemical (40 CFR 372.65)

**OSHA Classification** Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

**NFPA Hazard Rating** Not found

**Genium Hazard Rating**

4 = Extreme  
3 = High  
2 = Moderate  
1 = Slight  
0 = Minimum



**HMIS**

H 2  
F 0  
R 0

**Description** White or slightly greenish or yellow, crystalline powder. Derived by dissolving molybdenum trioxide in aqueous ammonia.

**Overview** Ammonium molybdate is an irritant. In the school environment, it may be used in the chem lab as an analytical reagent for alkaloids and many other substances. Wear gloves and goggles when handling this material. Ammonium molybdate may also be used in the art room in pigments for decorating ceramics. Also used in photography and in the production of molybdenum metal; for detecting and determining phosphates, arsenates, and lead; as a source of molybdate ions; as a catalyst for dehydrogenation and desulfurization in petroleum and coal technology; and as a lubricant.

**Manufacturer** Always request an up-to-date MSDS from your chemical supplier. That sheet should include the manufacturer and their emergency phone numbers. This *Manual's* Resources/Manufacturers Index lists some larger manufacturers and available emergency phone numbers.

## ♦ SECTION 2 USE AND STORAGE DATA

**Preliminary Planning Considerations** Plan and provide for safe disposal of all school-generated chemical waste. Check applicable regulations prior to use. Provide adequate general or local exhaust ventilation to avoid exceeding the TLV (Sec. 4) or restrict use to fume hood, especially if ammonium molybdate is being heated. Contact lens use when handling chemical materials is controversial. In some cases, soft lenses can actually protect eyes from chemicals. In other cases, chemical entrapment is presumed a possible hazard. Particles adhering to contact lens surfaces can cause corneal damage. For safety, always wear safety glasses or goggles. Wear rubber gloves to minimize skin contact. Employees and students should know the location of eyewash and shower facilities near chemical use areas. Check that eyewash stations and safety showers are working properly.

**Usage Precautions and Procedure** Before using, read this material's container label and follow all precautions. Do not smoke in usage or storage areas. Practice good housekeeping to avoid unintentionally mixing incompatibles. Do not allow chemical residue or dust buildup in lab or work areas. Wear safety glasses or goggles and appropriate protective clothing to work with ammonium molybdate tetrahydrate. Keep this material away from notebooks, textbooks, and personal belongings to avoid transporting chemical residues from the lab/work area. After working with chemical materials, and before eating, drinking, or smoking, always wash hands and face. Remove and launder contaminated clothing before reusing.

**Additional Data** Ammonium molybdate is stable at room temperature under normal handling and storage conditions. It does not polymerize. Incompatibles include alkali metals, sodium, potassium, and molten magnesium.

**Preferred Storage Location and Methods** Store in tightly closed containers in a cool, well-ventilated area out of direct sunlight and away from incompatibles. To separate incompatible chemicals, store by chemical family, not by alphabetical name. Protect all chemical containers from physical damage. Prohibit smoking in chemical storage areas. Purchase amounts sufficient for one year's use or less.

## ♦ SECTION 3 SPILL/DISPOSAL PROCEDURES

**If Spilled** Ventilate spill area. Promptly and thoroughly clean up spilled material. Cleanup personnel should protect against inhalation and skin or eye contact. For liquid (solution) spills, cover with an inert solid absorbent (vermiculite, dry sand, etc.) and scoop into appropriate containers (with secure lid) for disposal in accordance with existing regulations. As needed, dike spill area with inert absorbent material to contain spill. For dry spills, carefully collect spilled material and scoop into secure disposal or reclamation containers. Avoid creating airborne dust conditions. Vacuum (with appropriate filter) or wet mop to minimize dust dispersion.

**Disposal of Small Quantities** Handle emptied containers carefully since residues may remain. Always check regulations before disposal. Investigate recycling or reclamation rather than landfill disposal. If these methods are not practical, feasible, or in accord with existing regulations, contact your supplier or a licensed disposal contractor for specific treatment/disposal procedures.

**Disposal of Larger Amounts** Contact your supplier or a licensed disposal company.

**Follow all applicable local, state, and Federal regulations for all waste disposal.**

## ♦ SECTION 4 HEALTH HAZARDS

The irritant and systemic effects of ammonium molybdate tetrahydrate are attributed to ammonium and molybdenum, respectively. Soluble molybdenum compounds such as ammonium molybdate are of low toxicity. Hexavalent molybdenum compounds are readily absorbed through the gastrointestinal (GI) tract. By analogy with effects caused in animals, it may cause mucous membrane irritation, anemia, anorexia, dyspnea (shortness of breath), and incoordination. Persons with a

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history of chronic respiratory or blood disease may be at increased risk from exposure. However, there are no reports of human effects from industrial exposure. Evidence suggests that molybdenum (Mo) may produce liver dysfunction, gout (painful inflammation of the joints), and hypothyroidism (deficient activity of the thyroid gland characterized by general loss of vigor and lowered metabolic rate).

**1991-92 ACGIH TLV** 8-hr TWA: 5 mg/m<sup>3</sup> (molybdenum soluble compounds)

**1990 NIOSH REL** 10-hr TWA: None established

**1990 OSHA PEL** 8-hr TWA: 5 mg/m<sup>3</sup>

**1985-6 Toxicity Data** Rat, oral, LD<sub>50</sub>: 333 mg/kg (diamonium molybdate)

**Carcinogenicity** Not listed by the IARC, NTP, or OSHA

**Acute Effects** Irritating to the eyes, nose, and throat.

**Chronic Effects** None reported

#### ♦ SECTION 5 FIRST AID PROCEDURES

**Eye Contact** Promptly flush eyes with plenty of running water for at least 15 min, including under eyelids. If pain or irritation persist, get prompt medical attention.

**Skin Contact** After flushing with large amounts of water, wash exposed areas with soap and water. If pain or irritation persist, get prompt medical attention.

**Inhalation** Remove victim from exposure to fresh air and support breathing as necessary. If cough or difficulty in breathing develops, get prompt medical attention.

**Ingestion** Never give anything by mouth to an unconscious or convulsing person. Immediately dilute with 4 to 8 oz. (120 to 240 mL) of milk or water (not to exceed 15 mL/kg in a child). Get prompt medical attention.

*Get proper in-school, paramedic, or community medical attention and support.*

#### ♦ SECTION 6 FIRE PROCEDURES AND DATA

**Fire Hazards** For major fires, or for fires involving large quantities, firefighters should wear appropriate protective clothing and respirators. Because fire may produce toxic thermal decomposition products, a self-contained breathing apparatus (SCBA) is recommended.

**Flash Point and Method** Nonflammable

**Autoignition Temperature** None reported

**Flammability Limits in Air (vol. %)** None reported

**Hazardous Decomposition Products** Thermal oxidative decomposition of ammonium molybdate produces toxic ammonia (NH<sub>3</sub>) and nitrogen oxide (NO<sub>x</sub>) fumes.

**Extinguishing Media** Use water fog, carbon dioxide (CO<sub>2</sub>), dry chemical, foam, or other media appropriate to surrounding fire conditions.

#### ♦ SECTION 7 PHYSICAL DATA

**Melting Point** Decomposes

**Solubility in Water** Soluble in 2.3 parts water; practically insoluble in alcohol

**pH of 5% Aqueous Solution** 5.0 to 5.5

**Molecular Weight** 1235.86

**Density** 2.27

**References** 38, 100, 124, 126, 127, 132, 133, 136, 148, 162, 164, 166, 527

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