

# Ammonium molybdate

sc-227258



The Power to Question

## Material Safety Data Sheet

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

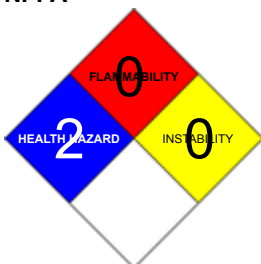
### PRODUCT NAME

Ammonium molybdate

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Santa Cruz Biotechnology, Inc.  
2145 Delaware Avenue  
Santa Cruz, California 95060  
800.457.3801 or 831.457.3800

### EMERGENCY

ChemWatch  
Within the US & Canada: 877-715-9305  
Outside the US & Canada: +800 2436 2255  
(1-800-CHEMCALL) or call +613 9573 3112

### SYNONYMS

H<sub>8</sub>MoN<sub>2</sub>O<sub>4</sub>, H<sub>24</sub>-Mo<sub>7</sub>-N<sub>6</sub>-O<sub>24</sub>.4H<sub>2</sub>O, (NH<sub>4</sub>)<sub>6</sub>Mo<sub>7</sub>O<sub>24</sub>.4H<sub>2</sub>O, MoO<sub>4</sub>.2NH<sub>4</sub>, "ammonium molybdate, anhydrous", "diammonium molybdate", "ammonium molybdate (VI) tetrahydrate", tetrahydrate, "molybdic acid, diammonium salt", "ammonium paramolybdate", "ammonium dimolybdate", "diammonium tetraoxomolybdate(2-)", "APS AR00000046"

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	0	
Toxicity	2	
Body Contact	2	
Reactivity	0	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



**CANADIAN WHMIS SYMBOLS****EMERGENCY OVERVIEW****RISK**

Harmful if swallowed.

Danger of cumulative effects.

May cause SENSITISATION by skin contact.

Irritating to eyes, respiratory system and skin.

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**POTENTIAL HEALTH EFFECTS****ACUTE HEALTH EFFECTS****SWALLOWED**

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

■ Molybdenum, an essential trace element, can in large doses hamper growth and cause loss of appetite, listlessness and diarrhoea.

Anaemia also occurs, and other symptoms include greying of hair, shrinking of the testicles, reduced fertility and milk production, shortness of breath, incoordination and irritation of the mucous membranes.

■ Large doses of ammonia or injected ammonium salts may produce diarrhoea and may be sufficiently absorbed to produce increased production of urine and systemic poisoning.

Symptoms include weakening of facial muscle, tremor, anxiety, reduced muscle and limb control.

**EYE**

■ This material can cause eye irritation and damage in some persons.

**SKIN**

■ This material can cause inflammation of the skin on contact in some persons.

■ The material may accentuate any pre-existing dermatitis condition.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

**INHALED**

■ The material can cause respiratory irritation in some persons.

The body's response to such irritation can cause further lung damage.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

■ Bronchial and alveolar exudate are apparent in animals exposed to molybdenum by inhalation.

Molybdenum fume may produce bronchial irritation and moderate fatty changes in liver and kidney.

**CHRONIC HEALTH EFFECTS**

■ Substance accumulation, in the human body, is likely and may cause some concern following repeated or long-term occupational exposure.

Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused

by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

High levels of molybdenum can cause joint problems in the hands and feet with pain and lameness. Molybdenum compounds can also cause liver changes with elevated levels of enzymes and cause over-activity of the thyroid gland. A generalised feeling of unwellness can occur, with tiredness, weakness, diarrhoea, loss of appetite and weight. Molybdenum has been associated with cancers of the airways, but on the other hand, a low intake of molybdenum may cause an increased risk of developing oesophageal cancer.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
ammonium molybdate	13106-76-8	100

### Section 4 - FIRST AID MEASURES

#### SWALLOWED

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

#### EYE

If this product comes in contact with the eyes

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

#### SKIN

If skin contact occurs

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

#### INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

#### NOTES TO PHYSICIAN

- for poisons (where specific treatment regime is absent)

#### BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 L/min.
- Monitor and treat, where necessary, for pulmonary oedema .

Treat symptomatically.

### Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG)	Not applicable.
Upper Explosive Limit (%)	Not applicable
Specific Gravity (water=1)	2.3 - 2.4
Lower Explosive Limit (%)	Not applicable

#### **EXTINGUISHING MEDIA**

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

#### **FIRE FIGHTING**

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.

#### **GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

- Non combustible.
  - Not considered a significant fire risk, however containers may burn.
- Decomposition may produce toxic fumes of nitrogen oxides (NO<sub>x</sub>), metal oxides.  
May emit poisonous fumes.  
May emit corrosive fumes.

#### **FIRE INCOMPATIBILITY**

None known.

### **Section 6 - ACCIDENTAL RELEASE MEASURES**

#### **MINOR SPILLS**

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.

#### **MAJOR SPILLS**

Moderate hazard.

- CAUTION Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.

### **Section 7 - HANDLING AND STORAGE**

#### **PROCEDURE FOR HANDLING**

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

#### **RECOMMENDED STORAGE METHODS**

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

#### **STORAGE REQUIREMENTS**

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE CONTROLS**

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Peak ppm	Peak mg/m <sup>3</sup>	TWA F/CC	Notes
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)	-	5	-	10				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) - Total dust)		15						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) - Total dust)		10						
US - Idaho - Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) Insoluble compounds)		5						
US - Minnesota Permissible Exposure Limits (PELs)	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)		5						
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	ammonium molybdate (Molybdenum (as Mo) Soluble compounds)		5						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)		5						
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)		5						
US - Hawaii Air Contaminant Limits	ammonium molybdate (Molybdenum (as		5		10				

	Mo) Soluble compounds)			
US - Alaska Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo) Soluble compounds)	5		
US - Washington Permissible exposure limits of air contaminants	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)	5	10	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	ammonium molybdate (Molybdenum, (as Mo) Soluble compounds, (respirable fraction++))	0.5	1.5	
Canada - Nova Scotia Occupational Exposure Limits	ammonium molybdate (Molybdenum - Soluble compounds (as Mo))	0.5		TLV Basis lower respiratory tract irritation
US OSHA Permissible Exposure Levels (PELs) - Table Z1	ammonium molybdate (Molybdenum (as Mo) - Soluble compounds)	5		
US - Michigan Exposure Limits for Air Contaminants	ammonium molybdate (Molybdenum, (as Mo) Soluble compounds)	5		
Canada - Northwest Territories Occupational Exposure Limits (English)	ammonium molybdate (Molybdenum (as Mo) Soluble compounds)	5	10	
Canada - Alberta Occupational Exposure Limits	ammonium molybdate (Molybdenum, as Mo - Soluble compounds, respirable)	0.5		
US ACGIH Threshold Limit Values (TLV)	ammonium molybdate (Molybdenum, as Mo Soluble compounds)	0.5		TLV® Basis LRT irr

US - California Permissible Exposure Limits for Chemical Contaminants	ammonium molybdate (Molybdenum, soluble compounds, as Mo)	0.5	(n)
Canada - British Columbia Occupational Exposure Limits	ammonium molybdate (Molybdenum - Soluble compounds, as Mo, Respirable)	0.5	
Canada - Prince Edward Island Occupational Exposure Limits	ammonium molybdate (Molybdenum, as Mo Soluble compounds)	0.5	TLV® Basis LRT irr
US - Oregon Permissible Exposure Limits (Z-1)	ammonium molybdate (Molybdenum (soluble compounds))	- 5	<b>Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits.</b>
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	ammonium molybdate (Molybdenum (as Mo) Soluble compounds)	5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	ammonium molybdate (Molybdenum (as Mo)- Soluble compounds)	5	

## PERSONAL PROTECTION



## RESPIRATOR

- Particulate. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

## EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and

remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

## HANDS/FEET

### NOTE

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc

### OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.

## ENGINEERING CONTROLS

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

Mixes with water.

State	Divided solid	Molecular Weight	196.01
Melting Range (°F)	194 (-H <sub>2</sub> O)	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not Applicable	pH (1% solution)	5.0-5.5 (5% )
Decomposition Temp (°F)	374	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not applicable	Vapour Pressure (mmHG)	Not applicable.
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	2.3 - 2.4
Lower Explosive Limit (%)	Not applicable	Relative Vapour Density (air=1)	Not applicable.
Volatile Component (%vol)	Nil @ 38 C.	Evaporation Rate	Not Applicable

### APPEARANCE

Odorless powder or crystals; mixes with water. Insoluble in alcohol. Ammonium molybdate based on (MoO<sub>4</sub>)<sup>(2-)</sup> should not be confused with a similarly called substance (also known as ammonium dimolybdate) based on



so-called (and equally confused) molybdic acid (85%).

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

### STORAGE INCOMPATIBILITY

- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignite on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.
- **WARNING** Avoid or control reaction with peroxides. All transition metal peroxides should be considered as potentially explosive. For example transition metal complexes of alkyl hydroperoxides may decompose explosively.
- The pi-complexes formed between chromium(0), vanadium(0) and other transition metals (haloarene-metal complexes) and mono-or poly-fluorobenzene show extreme sensitivity to heat and are explosive.
- Avoid reaction with borohydrides or cyanoborohydrides

For incompatible materials - refer to Section 7 - Handling and Storage.

## Section 11 - TOXICOLOGICAL INFORMATION

ammonium molybdate

### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

### CARCINOGEN

Molybdenum, as Mo Soluble compounds	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A3
CAS~	US - Maine Chemicals of High Concern List	Carcinogen	A3
CAS~	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV® Basis LRT irr
TWAMG_M3~	Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens	Notes	TLV Basis lower respiratory tract irritation

## Section 12 - ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### Section 13 - DISPOSAL CONSIDERATIONS

#### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorised landfill.
- Recycle containers if possible, or dispose of in an authorised landfill.

### Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

### Section 15 - REGULATORY INFORMATION

**ammonium molybdate (CAS: 13106-76-8,12054-85-2) is found on the following regulatory lists;**

"Canada - Saskatchewan Industrial Hazardous Substances","Canada CEPA Environmental Registry Substance Lists - List of substances on the DSL that meet the ecological criteria for categorization (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","US - New Jersey Right to Know Hazardous Substances","US DOE Temporary Emergency Exposure Limits (TEELs)","US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

### Section 16 - OTHER INFORMATION

#### Ingredients with multiple CAS Nos

Ingredient Name	CAS
ammonium molybdate	13106-76-8, 12054-85-2

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

[www.chemwatch.net/references](http://www.chemwatch.net/references).

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

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