LEADING THE WORLD IN MOLY

Climax Molybdenum
A Freeport-McMoRan Company
There is a growing global demand for molybdenum, a versatile element with diverse applications in the chemical, engineering and petroleum industries. Molybdenum and its alloys are key components in chemical and metallurgical applications.

Climax Molybdenum Company, a subsidiary of Freeport-McMoRan, is one of the world’s leading molybdenum producers. From our early beginnings in Colorado, Climax Molybdenum has grown into a global, diversified company with downstream operations and a proven commercial presence worldwide.

CLIMAX MINE BEGINS PRODUCTION
On April 2, 1918, Climax ships its first concentrate totaling 21,000 pounds with a market value of $100,000. Climax is a major contributor to the allied war effort during World War I.
Our operations in North America and South America include both primary and by-product molybdenum mines.

We are also one of the leading global producers of molybdenum with chemical and metallurgical products manufactured at our production facilities in the United States and Europe. Our Fort Madison’s conversion capabilities provide Climax Molybdenum with a premier source for upgraded molybdenum chemical products. The Climax Stowmarket plant in the United Kingdom provides ferromolybdenum and Climax Molybdenum B.V. in the Netherlands produces technical molybdic oxide, ammonium dimolybdate and pure molybdic oxide.

Serving customers worldwide, Climax Molybdenum’s resources are well positioned to maintain molybdenum production rates for decades to come.
Climax Molybdenum operates the Henderson Mine and Mill in the Rocky Mountains, west of Denver. It is the world’s largest primary producer of molybdenum and has been in operation since 1976. Henderson has the capability to produce between 30 and 40 million pounds of molybdenum per year.

Separated by the Continental Divide, the Henderson Mine and Mill are connected by one of the world’s longest conveyor systems, a 10 mile elevated belt that runs underneath the Continental Divide and emerges above ground for the final five miles.

Our Climax mine near Leadville, Colorado, restarted in 2012 and has a potential production capacity of 30 million pounds per year.
Corrosion Inhibition

Molybdate, usually in the form of Sodium Molybdate, is used as an anodic corrosion inhibitor in aqueous systems, such as cooling water treatments and automobile anti-freeze/coolant products. It is effective in inhibiting corrosion of steel, cast iron, aluminum, copper, brass, cadmium and solder, and is typically used with other corrosion inhibitors.

Historically Molybdenum compounds have been used in pigments generally called Molybdenum Orange, for use in paints, plastics and inks providing a reddish hue, cleanliness and striking colors. White corrosion inhibiting pigments are used as paint primers and other Molybdenum compounds are important components in organic toners. More recent uses include incorporation into Bismuth Vanadate Yellow and the emerging classes of Rare Earth Molybdenum high-performance pigments.

Smoke Suppressants

Molybdenum in the form of Ammonium Octomolybdate (AOM) or Molybdcic Oxide is used as a smoke suppressant in plastics, especially polyvinyl chloride (PVC). Common applications include wire and cable for use in plenum spaces, interiors of mass transit vehicles, carpet backing for commercial grades of vinyl backed carpet, and building materials for interior use in public buildings.

Chemical Applications of Molybdenum

Molybdenum metal and alloys are used in a number of important end products including lamp applications, glass melting electrodes and electronic devices. The characteristics of molybdenum metal powders are determined not only by the process conditions during reduction, but also by the physical and chemical properties of the starting materials.

The naturally occurring form of molybdenum (MoS2) is an important solid lubricant used primarily for reduction of wear and friction, and maintains good lubricating performance in tough conditions. Molybdenum complexes, soluble in petroleum oils and other organic solvents, are finding increased use as antiwear and extreme pressure additives as well as friction modifiers in lubricating oils, greases and coatings.

Molybdenum chemicals are used in the production of catalysts for a variety of reactions, notably hydrotreating and selective oxidation. The increasingly stringent requirements for low sulfur fuel oils, gasoline and diesel fuel make this application a particularly important use for molybdenum.

 Catalysts

 Pigments

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1957

Climax and American Metal Trading Company merge to become AMAX.

1976

Henderson begins production at the rate of 10,000 tons per day via panel caving from the 8,100 foot level.
Molybdenum is primarily used to improve the corrosion resistance of stainless steel in more demanding applications, such as chemical processing plants or in marine applications. The addition of molybdenum increases the pitting and crevice corrosion resistance of stainless steels in chloride containing solutions.

To increase hardness and wear resistance over a broad temperature, molybdenum is added to tool- and high-speed steel. It increases the strength and hardness of cast iron, as well as increases elevated temperature strength and creep resistance. In high-strength, low-alloy steels (HSLA) molybdenum improves strength and weldability.

Molybdenum is an important alloying element in high-performance nickel base alloys. The corrosion-resistant nickel base alloys find extensive use in the chemical processing, pharmaceutical, oil and gas, petrochemical, and pollution-control industries.

**1980**
**BREAKING RECORDS**
Climax and Henderson mines produce a record 100 million pounds of molybdenum; employment peaks at 3,000 at Climax and at 2,000 at Henderson.

**1993**
**AMAX MERGER**
Cyprus Minerals and AMAX merge becoming Cyprus AMAX.
PRODUCTION OF MOLYBDENUM PRODUCTS

MARKETS

The markets for molybdenum products are diverse, and we serve both the chemical and metallurgical market segments on a global basis.

- **Chemicals**
- **Mo Metal**
- **Super Alloys**
- **Cast Iron**
- **Tool & High Speed Steels**
- **Stainless Steels**
- **Constructional Steels**

Molybdenum Grade Alloy Steels & Irons 99%

**SOURCE: INTERNATIONAL MOLYBDENUM ASSOCIATION’S SMR END USE 2012 EXECUTIVE SUMMARY**

1996

**HENDERSON REPLACES TRAIN**

Project at Henderson commences to replace train with an underground crusher and 15 mile long conveyor system.

1999

**CONVEYOR SYSTEM COMPLETE**

Phelps Dodge purchases Cyprus AMAX; conversion from train haulage to conveyor system is completed.
Climax Molybdenum is committed to sustainable development, combining social and environmental responsibility with economic growth. We aim to minimize environmental impacts by implementing strategies based on valid data and sound science, and we work to maintain a safe workplace by having a solid framework for managing risk and meeting compliance obligations.
At Climax Molybdenum, we mine metals and produce products for the future. With growth in demand for our products, we continue to explore opportunities to provide more molybdenum to the world while respecting our sustainable priorities and maintaining safe operations.
CHEMICAL PRODUCTS
- Ammonium Octamolybdate
- Ammonium Dimolybdate
- Ammonium Heptamolybdate
- Sublimed Pure Molybdoc Oxide
- Sodium Molybdate
- Molybdenum Dioxide

METALLURGICAL PRODUCTS
- Ferromolybdenum
- Technical Molybdenum Oxide Powder
- Carbon Free Briquettes

OTHER
- Ammonium Perrhenate
- Rhenium Pellets

LOCATIONS AND CONTACTS

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