

## MOLYBDENUM

...The Rising Star of Metals

Chemical Symbol: Mo

*Due to its versatility, industry has sought to develop new materials that benefit from the alloying properties of molybdenum.*

*Source: US Geological Survey*



*Artistic Symbol of Molybdenum*

*Source: Metalprices.com*

### What is Molybdenum?

Molybdenum is a soft, lustrous silver grey flaky metal (easily confused with graphite) commonly associated with porphyry copper deposits as a by-product. Molybdenite ( $\text{MoS}_2$ ) is the natural mineral sulphide form of the metal. A quarter of all world molybdenum consumption is used for stainless steel applications – the addition of molybdenum strongly improves the corrosion resistance of stainless steels in a wide variety of environments.



*Molybdenite & Quartz sample*

### Properties

Molybdenum is located between chromium and tungsten in the Periodic Table. The metal's unique properties include:

- enhanced strength and weldability
- corrosion resistance
- elevated temperature strength
- thermal and electrical conductivity

V	Cr	Mn
Nb	<sup>42</sup> Mo	Tc
Ta	W	Re

*Source: IMOA*

### Main Uses of "Moly"

Primary uses are in alloys in the steel industry, particularly stainless steel, construction steel, oil and gas pipelines and superalloys (aerospace). An increasing use is associated with catalysts in fuel refining. Key end use sectors are construction, engineering, machinery and transportation (automotive, shipbuilding, aircraft and aerospace).



*Valve casting containing up to 20% Mo to withstand severe corrosion and high temperatures (Source – IMOA)*

### Greening Fuel Emissions

Molybdenum is one of the most important components in catalysts which are used to remove sulphur from carbon based fossil fuels. As world reserves of oil and gas are depleted, an increase in production of lower quality, sulphur-rich oil and gas means that these hydrocarbons need to be "cleaned up", thus requiring the use of Moly Oxide.

### World Supply & Demand

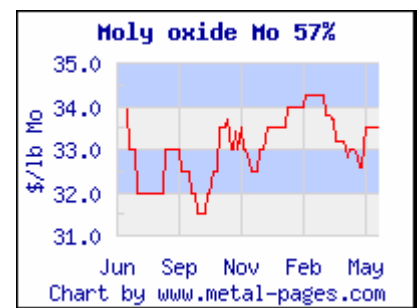
The distribution of molybdenum reserves and production is concentrated in only a few countries, with China, USA, Chile and Canada holding nearly 90% of known reserves. Approximately 60% of all molybdenum produced is as a by-product, mainly from copper operations. The other 40% comes from primary production, with more than half of that generated in China.

Metal demand has increased significantly in recent years, largely due to China's increased demand for stainless steel. According to the International Stainless Steel Forum, the fastest growing type of stainless are those with lesser nickel in their composition. Examples include austenitic condenser tubes in nuclear reactors and power plants, containing between 3 and 4 per cent molybdenum. Such power plants can contain up to 40,000 pounds of the metal.

Molybdenum applications are constantly growing particularly in relation to the metal's strong resistance to corrosion. Desalination plants and waste water treatment operations are necessary in many arid regions of the world – a potential key driver of future demand.

### Recent Price Movements

Movements in the price of molybdenum have traditionally been highly correlated to oil prices and world economic activity. The molybdenum market is very large, with an estimated US\$13 billion supply in 2006. As at 29 May 2008, the metal was trading at US\$33.15 lb (or A\$76,000 per tonne) which compares with an average of US\$29 lb over the last three years.



*12 Month US\$/lb price chart of Molybdenum*

### Future of Molybdenum

Moly's stunning rise to prominence earlier this decade caught the market by surprise and it is only in the last 18 months that pundits have really understood the reasons behind the price surge. So much so, that many experts are predicting the molybdenum market will continue to outshine its peers in the near term. With expanding uses and growing demand, molybdenum is set to grab the spotlight in future years and is considered in many circles as the "Rising Star of the Metals Market".