MOLYBDENUM – Mo

History

Molybdenum was first discovered as an element in 1778 and first isolated as metal in 1781. It is primarily used to create steel alloys which need to be highly resistant to heat and corrosion. It gains its name from the Greek word for lead, *molybdos*, as its ores were originally mistaken for lead compounds[i].

Geology

Molybdenum only occurs as mineral ore, most commonly molybdenite (MoS_2) but also in wulfenite ($PbMoO_4$) and powellite ($CaMoO_4$), and it does not occur as a native metal. Deposits usually occur in high-temperature hydrothermal veins, disseminated porphyry type deposits (with and without associated major copper mineralization), in contact metamorphic deposits in limestone with calcium silicate minerals and in pegmatites, granites, and aplites[ii]. Ores containing molybdenum often occur alongside those of tin and tungsten and copper. As such Molybdenum is often obtained as a byproduct of mining and processing of these metals.

In 2011, global Identified resources of molybdenum were estimated to be about 14 million tonnes. Total global production of molybdenum of that year amounted to 250kt, a 29kt increase from 2009. The majority of global molybdenum output was produced by China, the USA, Chile and Peru[iii].

Victoria

Deposits of molybdenite are found across Victoria however, there has been limited mining to date and only five deposits have see commercial production. The largest of producing deposit was at Everton which produced 325 tonnes of molybdenum between 1917 and 1944[iv]. Despite this history of molybdenum in Victoria Geoscience Australia's repot on *Australia's Identified Mineral Resources 2011* did not recognise any Economic Demonstrated Resources of molybdenum in Victoria[v]. There is currently a deep drilling project underway near Corryong aimed at defining a Molybdenum-copper-silver porphyry formation which has the potential to be a world class deposit[vi].

Pure molybdenum crystal
Source: Hi-Res Images of Chemical Elements – A Virtual Museum http://images-of-elements.com/molybdenum.php

Use

Molybdenum has a number of uses; the most common of which application to structural steel and stainless steel. Its usefulness comes from its ability to make steel extremely hard (able to withstand up to 21,000 kilograms per square centimetre) and extremely resistant to high temperatures (molybdenum's melting point is 2623°C)[vii]. It is also used for a number of chemical applications, including in catalysts, lubricants, and pigments. For many of molybdenum's uses there is no substitute, in fact researchers are constantly seeking new ways to use it due to its relative abundance and amazing utility in creating super-alloys.

[i] Thomas Jefferson National Accelerator Facility - Office of Science Education (2012) It's Elemental: The periodic table of elements, *The Element Molybdenum* http://education.jlab.org/itselemental/ele042.html
[ii] John W. Anthony, Richard A. Bideaux, Kenneth W. Bladh, and Monte C. Nichols, Eds. (2012), *Handbook of Mineralogy, Mineralogical Society of America*, Chantilly, USA. http://www.handbookofmineralogy.org.
[iii] U.S. Geological Survey, Mineral Commodity Summaries, January 2012, Molybdenum http://minerals.usgs.gov/minerals/pubs/commodity/molybdenum/mcs-2012-molyb.pdf
[iv] Victorian Department of Primary Industries (2012), Earth Resources, *Molybdenum* http://www.dpi.vic.gov.au/earth-resources/minerals/metals/molybdenum
[v] Geoscience Australia (2012) *Australia's Identified Mineral Resources 2011*. Geoscience Australia, Canberra. https://www.ga.gov.au/image_cache/GA20563.pdf
[vi] Dart Mining, Unicorn Project http://www.dartmining.com.au/projects/project-locations
[vii] Ibid Thomas Jefferson National Accelerator Facility.