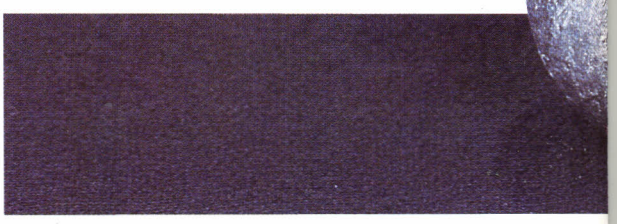
CAD

Submitted by Senior Sustaining Metallurgist, Glenn Poynter

A Brief History

Cadmium, in comparison with other metals, was only recently discovered. In 1817, German metallurgist F Strohmeyer first isolated cadmium from its oxide. It was soon after that the other scientists Hermann, Meissner and Karsten independently discovered the new metal. Several names were proposed including melinium, from melinus, a yellow quince, klaprothium and junonium. Strohmeyer published an account of his investigations into the metal in 1818 from which his proposal to name the metal cadmium was finally accepted. The metal was named after the ancient Greek name for zinc oxide and is derived from the 'Zinc-Flowers' or 'Cadmia Fornacum' that Strohmeyer used to extract the cadmium.

Cadmium is a rare element, comprising approximately 0.1 to 0.2 parts per million of the earth's crust. Metallic cadmium does not occur naturally. Compounds of cadmium are found in very small quantities principally with the ores of zinc and less commonly with the ores of lead and copper. Cadmium sulphide or greenockite, the mineralogical ore of cadmium, has a honey-yellow to orange-red colour and a nearly transparent lustre. No greenockite deposits have been discovered. Other naturally occuring forms of cadmium include otavite, cadmium carbonate and cadmiferous zinc ore.



Properties

Name	Cadmium
Chemical formula	Cd
Atomic number	48
Atomic mass	112.4
Specific gravity	8.65 (times heavier than water)
Melting point	320.9°C
Boiling point	767.0°C

Cadmium metal is blue-tinged silver white in colour, is malleable and ductile and may be easily cut with a knife. Cadmium is brilliant in lustre when fresh yet tarnishes in air. It is sufficiently malleable and ductile to be beaten into thin foil and drawn into wire.

Uses of Cadmium

Cadmium has many chemical and industrial uses. The major uses are batteries, electro-plating, pigments, stabilisers and alloys. The low melting point of cadmium allows burning to form cadmium oxide, an important ingredient in many industrial applications such as batteries and plastic stabilisers. The production of nickel-cadmium batteries has seen a steady increase over the last twenty years. The excellent corrosion resistance of cadmium makes it ideal for electroplating steel to prevent rusting and cadmium's low coefficient of friction and its resistance to fatigue accounts for its use in alloying, particularly in bearing applications.

Cadmium possesses the ability to form a large range of inorganic, organic and organometallic compounds. These compounds are used in diverse applications such as the production of pigments, catalysts and in dentistry.

Cadmium stabilisers are the best group of materials for stabilising polyvinylchloride (PVC). In a more exotic application, in nuclear power plants cadmium is used in the control rods to control the rate of atomic fission.

Other less widespread uses for cadmium include solder, lasers, lubricant additive, photographic image stabiliser and photovoltaic cells.

Production

Pasminco Metals - Sulphide (PM-S) produces approximately 45 tonne of extremely high purity cadmium (99.995%) each month. This high quality cadmium is produced in a small distillation column and is sold exclusively to Sanyo in Japan for nickel-cadmium battery manufacturing. The small distillation column (the 'baby column') is fed with cadmium rich zinc bars produced in the Refinery and caustic cadmium bars produced in the Cadmium Plant. Approximately one-third of the cadmium enters from the Refinery and two-thirds from the Cadmium Plant. PM-S has also been accepting caustic cadmium bars from our sister company Pasminco Metals - BHAS to complement cadmium production.

Right: Cadmium Furnace Operator, Aaron Fordham, taps the furnace to produce caustic cadmium bars.

Customer and Market Focus

Western world demand for cadmium has grown strongly through the 1980s, particularly in the Asian region. Growth in battery section demand has offset the decline in other sectors over the period. Japan is dominant in the supply of nickel-cadmium batteries to the world, with production doubling every four years.

Sulphide sells all its output to Sanyo in Japan, where it is used in the manufacture of nickel-cadmium batteries. The high quality and purity of Sulphide's cadmium enables us to secure long term business in the highly competitive Japanese market.