



Manganese

Description

Manganese is a chemical element with the atomic number $Z = 25$. It is a transition metal of the first long period of the periodic table located between chromium and iron. It has properties in common with both metals. It is not frequently used in its pure form, but is very important in the manufacturing of steel. It is the twelfth most abundant element in the Earth's crust, where it is widely distributed.

It is found in hundreds of minerals, but there are just a dozen with industrial interest. The most important ones are: Pyrolusite (MnO_2), Psilomelane ($MnO_2 \cdot H_2O$), Manganite ($MnO(OH)$), Braunite ($3Mn_2O_3 \cdot MnSiO_3$), Rhodonite ($MnSiO_3$), Rhodochrosite ($MnCO_3$) and Hübnerite ($MnWO_4$, etc.).

The countries with the largest deposits of Manganese ore are South Africa, Ukraine, Bolivia and China. The metal is obtained by aluminothermic reduction of Manganese oxides, and ferro-manganese is also obtained by carbothermic reduction of iron oxides and manganese.

Properties

Physical Properties		Electronic Properties	
Name	Manganese	Valence	2, 3, 4, 6, 7
Atomic Number	25	Electro negativity	1.5
Symbol	Mn	Covalent Radius	1.39
Atomic Weight	54.938	Ionic Radius	0.80
Density (g/ml)	7.43	Atomic Radius	1.26
Boiling Point °C	2061	Atomic Structure	$[Ar]3d^54s^2$
Melting Point °C	1245	Ionization Potential (eV)	7.46

Manganese is a very reactive metal. Although the solid metal reacts slowly, the metal powder easily reacts, and in some cases very vigorously. When heated in presence of air or oxygen, manganese in powder forms a red oxide, Mn_3O_4 . When mixed with water at room temperature, it produces hydrogen and manganese (II) hydroxide ($Mn(OH)_2$). In the case of acid attacks, being a very reactive metal, it releases hydrogen, and manganese salt (II) is produced. Manganese also reacts at high temperatures with halogens, sulphur, nitrogen, carbon, silicon, phosphorus and boron.

Manganese is easily oxidized when exposed to air, forming a brown layer of oxide even at high temperatures. In this respect, its behaviour is much like its periodic table neighbour - iron.

Manganese is not classified as hazardous substance by EU Regulations and is not considered as a dangerous good for transportation.

Uses

- Manufacturing of steel and stainless steel.
- Alloying agent in several aluminium alloys.
- Manufacturing of batteries as manganese dioxide.

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