



Manganese

Description

Chemical element with the atomic number $Z = 25$. Is a transition metal of the first long period of the periodic table where it is 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 manufacture of steel. It is the twelfth most abundant element in Earth's crust where is widely distributed.

It is found in hundreds of minerals, but there are just a dozen with industrial interest. Most important are: Pyrolusite (MnO_2), Psilomelane ($MnO_2 \cdot H_2O$), Manganite ($MnO(OH)$), Braunite ($3Mn_2O_3 \cdot MnSiO_3$), Rhodonite ($MnSiO_3$), Rhodochrosite ($MnCO_3$), 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 . Mixed with water at room temperature it produces hydrogen and manganese (II) hydroxide ($Mn(OH)_2$). In the case of acids attack, being a very reactive metal, it releases hydrogen and a salt of manganese (II) is produced. Manganese also reacts at high temperatures with halogens, sulphur, nitrogen, carbon, silicon, phosphorus and boron.

Manganese is easily oxidized 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 neither classified as hazardous substance by the EU Regulations and nor considered as a dangerous good for its transport.

Uses

- Steel and stainless manufacturing.
- Alloying agent in several Aluminium alloys.
- Batteries manufacturing as Manganese dioxide

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