

Sodium

Na

General Information

Discovery

Sodium was isolated by Sir Humphry Davy in 1807 in London, by the electrolysis of molten sodium hydroxide.

Appearance

Sodium is a soft, silvery-white metal which is generally stored in paraffin, as it oxidises rapidly when cut.

Source

Sodium is the sixth most abundant element on Earth, and comprises 2.6% of the Earth's crust. The most common compound is sodium chloride, but it also occurs in many minerals, among which are cryolite, zeolite and sodalite. It is never found free in nature, due to its great reactivity. It is obtained commercially by the electrolysis of dry molten sodium chloride.

Uses

Metallic sodium is used in the manufacture of sodamide and esters, and in the preparation of certain organic compounds. Other uses of the metal include descaling and purifying metals, and alloy formation. One alloy of sodium with potassium is an important heat transfer agent. Sodium compounds are important in several industries, including paper, glass, soap, textile, petroleum and metal. Salt is also of vital nutritional importance.

Biological Role

Sodium is essential to all animals, and this has been recognised since prehistoric times. Although it is considered non-toxic, too much salt in the diet has been linked to high blood pressure under certain circumstances.

General Information

Sodium is very reactive, and should be handled with care. It floats on water, decomposing it with the evolution of hydrogen and the formation of sodium hydroxide. It may or may not ignite spontaneously on the water, depending on the amount of metal exposed to the water. It normally does not spontaneously ignite in air at temperatures below 115°C.

Physical Information

Atomic Number	11
Relative Atomic Mass ($^{12}\text{C}=12.000$)	22.990
Melting Point/K	370.96
Boiling Point/K	1156.1
Density/kg m ⁻³	971 (273K)
Ground State Electron Configuration	[Ne]3s ¹
Electron Affinity (M-M ⁻)/kJ mol ⁻¹	-21

Key Isotopes

Nuclide	²² Na	²³ Na	²⁴ Na
Atomic mass	21.994	22.990	23.991
Natural abundance	0%	100%	0%
Half-life	2.602 yrs	stable	15.0 h

Ionisation Energies/kJ mol⁻¹

M - M ⁺	495.8
M ⁺ - M ²⁺	4562.4
M ²⁺ - M ³⁺	6912
M ³⁺ - M ⁴⁺	9543
M ⁴⁺ - M ⁵⁺	13353
M ⁵⁺ - M ⁶⁺	16610
M ⁶⁺ - M ⁷⁺	20114
M ⁷⁺ - M ⁸⁺	25490
M ⁸⁺ - M ⁹⁺	28933
M ⁹⁺ - M ¹⁰⁺	141360

Other Information

Enthalpy of Fusion/kJ mol ⁻¹	2.64
Enthalpy of Vaporisation/kJ mol ⁻¹	99.2

Oxidation States

Main	Na ⁺¹
Others	Na ⁻¹ (in NH ₃ liq)