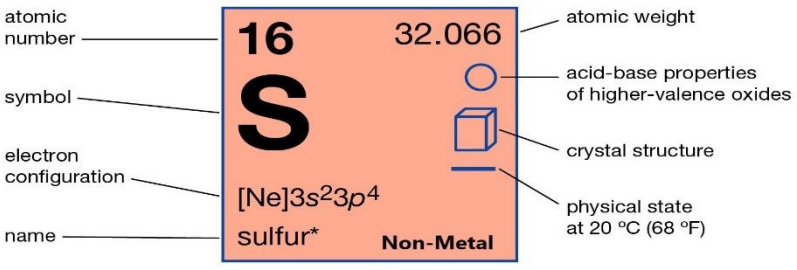
SULPHUR

History

Sulphur, the tenth most abundant element in the universe, the fifth most common on Earth and has been known since ancient times.

It is referred to in the Bible as "brimstone." It was French chemist Antoine Lavoisier who, in 1777, proved that Sulphur was one of the elements and not a compound.

Sulphur gets its name from the Latin word "sulphur" which is formed from a Latin root Isotopes



Group Number: 16	Group Name: Chalcogen
Period Number: 3	Upper Right Side of Period

Position In Periodic Table

Physical Properties

Melting Point: 388.36 K

Boiling Point: 717.75 K

Density: 2.067 grams per cc

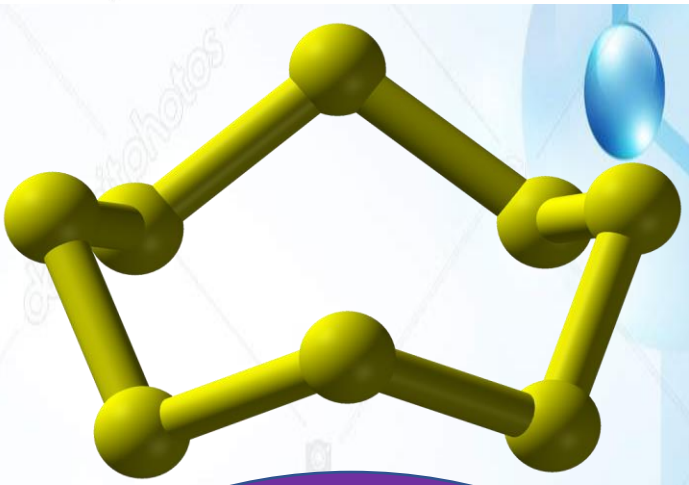
Phase at Room Temperature: Solid

Atomic radius, non-bonded (Å): 1.80

Covalent radius (Å): 1.04

Vanderwaals radius (Å): 1.27

Pure Sulphur is a tasteless, odourless, brittle solid that is pale yellow in colour.



Chemical Properties

Ionization Energy: 10.360 eV

Electron affinity (kJ mol−1): 200.41

Electronegativity (Pauling scale): 2.58

Common oxidation states: +6, +4, +2, -2.

Sulphur works as a good electrical insulator.

Sulphur is insoluble in water.

Sulphur emits a blue flame and melts into a molten red liquid when burnt.

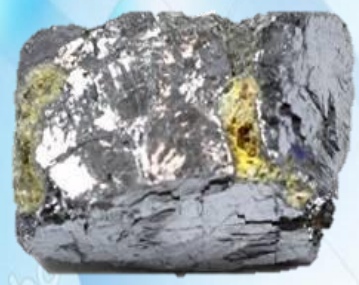
Allotropes

It displays three allotropic forms: Orthorhombic, Monoclinic and Amorphous.

The orthorhombic form is the most stable form of Sulphur.

Monoclinic Sulphur exists between the temperatures of 96°C and 119°C and reverts back to the orthorhombic form when cooled.

Amorphous Sulphur is formed when molten Sulphur is quickly cooled. Amorphous Sulphur is soft and elastic and eventually reverts back to the orthorhombic form.



Special Compounds

Sulphur combines with oxygen to form a toxic gas called Sulphur dioxide (SO2).

Sulphur dioxide when combined with water (H2O), forms Sulphurous acid (H2SO3).

It forms the gas hydrogen sulfide which is famous for having the strong odour of rotten eggs and is dangerous as it is flammable, explosive, and highly poisonous.

Sulphur chlorides react with ethylene to produce mustard gas, and with unsaturated acids derived from fats it forms oily products that are basic components of lubricants.

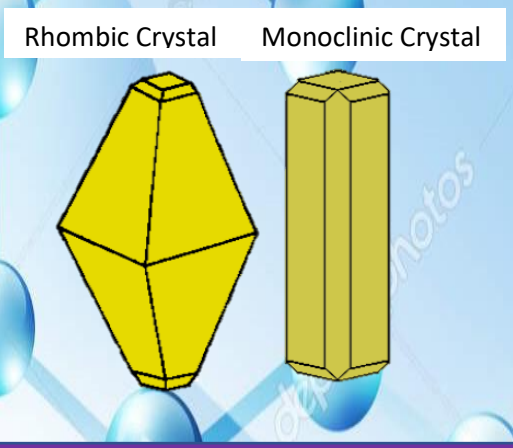
Thionyl chloride, SOCl2, is a dense, toxic, volatile liquid used in organic chemistry to convert carboxylic acids and alcohols into chlorine-containing compounds.

Carbon disulphide, CS2, is the analogue of carbon dioxide.

The radical -SH is called sulphydryl or mercaptan.

CH3SH, is a gas added to natural gas to give it an odour so that leaks will be noticed before an explosive mixture occurs.

Ore Compounds: galena (PbS), gypsum (CaSO4·2(H2O), pyrite (FeS2), sphalerite (ZnS or FeS), cinnabar (HgS), stibnite (Sb2S3), epsomite (MgSO4·7(H2O)), celestite (SrSO4) and barite (BaSO4).



Isotopes

23 Known Isotopes, 4 are stable

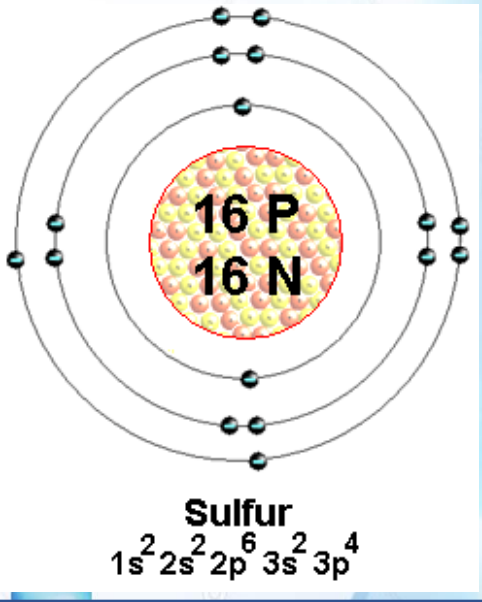
Sulphur-32S (95.02%), 33S (0.75%), 34S (4.21%), and 36S (0.02%),

- Three Radioactive isotope of Sulphur are

- Sulphur-35 which has the longest life of 87 days

- Sulphur-38, with a half-life of 170 minutes.

- Sulphur-49 with a half-life shorter than 200 nanoseconds.

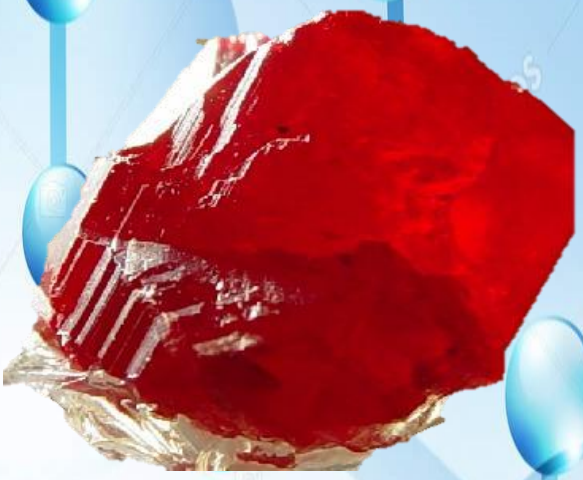


Interesting Facts About Sulphur

One of the moons of Jupiter, Io, appears yellow due to the large amount of Sulphur on its surface. This Sulphur comes from the many active volcanoes on the moon.

The main source of acid rain is when Sulphur dioxide enters the atmosphere and is converted into Sulphuric acid.

Sulphur is created deep inside massive stars by the fusion of silicon and helium.



Daily Life Usage

Industrial - majority of Sulphur is used to make the chemical Sulphuric acid which is used to make car batteries, fertilizer, refine oil, process water, and to extract minerals.

Sulphur based chemicals include the vulcanization of rubber, bleaching paper, and making products such as cement, detergents, pesticides. and gunpowder.

Sulphur also plays an important role in supporting life on Earth. It is the eighth most abundant element in the human body. Sulphur is part of the proteins and enzymes that make up our bodies. It is important in forming fats and strong bones.

Sulphur-35 is used commercially in medicine, the isotope is used to study the way fluids occur inside the body. It also has applications in research as a tracer.

Sulphur dioxide has a very obvious strong, choking odor. It is used as a bleaching agent, solvent, disinfectant and as a refrigerant.

Sulphur hexafluoride, SF6, is a gas employed as an insulator in various electrical devices.

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