

*** Name Origin:**

From the Persian word 'burah' and the Arabic word 'buraq', which is their word for borax.

*** Sources:**

Obtained from kernite, a kind of borax ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$).

*** Uses:**

Used with titanium and tungsten to make light weight heat resistant alloys. Also tennis rackets, regulators in nuclear plants, heat resistant glass and eye disinfectant.

*** Additional Notes:**

Boron compounds have been known for thousands of years, but the element was not discovered until 1808 by Sir Humphry Davy and by Gay-Lussac and Thenard. The element is not found free in nature, but occurs as orthoboric acid usually in certain volcanic spring waters and as borates in borax and colemanite. Ulexite, another boron mineral, is interesting as it is nature's own version of "fiber optics." Important sources of boron are the ores rasorite (kernite) and tincal (borax ore). Both of these ores are found in the Mojave Desert. Tincal is the most important source of boron from the Mojave.

Extensive borax deposits are also found in Turkey. Boron exists naturally as 19.9% ^{10}B isotope and 80.1% ^{11}B isotope. Eleven isotopes of boron are known. High-purity crystalline boron may be prepared by the vapor phase reduction of boron trichloride or tribromide with hydrogen on electrically heated filaments. The impure, or amorphous, boron, a brownish-black powder, can be obtained by heating the trioxide with magnesium powder. Boron of 99.9999% purity has been produced and is available commercially. Elemental boron has an energy band gap of 1.50 to 1.56 eV, which is higher than that of either silicon or germanium. It has interesting optical characteristics, transmitting portions of the infrared, and is a poor conductor of electricity at room temperature, but a good conductor at high temperature. Amorphous boron is used in pyrotechnic flares to provide a distinctive green color, and in rockets as an igniter. By far the most commercially important boron compound in terms of dollar sales is $\text{Na}_2\text{B}_4\text{O}_7 \cdot 5\text{H}_2\text{O}$. This pentahydrate is used in very large quantities in the manufacture of insulation fiberglass and sodium perborate bleach. Boric acid is also an important boron compound with major markets in textile fiberglass and in cellulose insulation as a flame retardant. Next in order of importance is borax ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$) which is used principally in laundry products. Use of borax as a mild antiseptic is minor in terms of dollars and tons. Boron compounds are also extensively used in the manufacture of borosilicate glasses. Other boron compounds show promise in treating arthritis. The isotope boron-10 is used as a control for nuclear reactors, as a shield for nuclear radiation, and in instruments used for detecting neutrons. Boron nitride has remarkable properties and can be used to make a material as hard as diamond. The nitride also behaves like an electrical insulator but conducts heat like a metal. It also has lubricating properties similar to graphite. The hydrides are easily oxidized with considerable energy liberation, and have been studied for use as rocket fuels. Demand is increasing for boron filaments, a high-strength, lightweight material chiefly employed for advanced

aerospace structures. Boron is similar to carbon in that it has a capacity to form stable covalently bonded molecular networks. Carboranes, metalloboranes, phosphacarboranes, and other families comprise thousands of compounds. Elemental boron and the borates are not considered to be toxic, and they do not require special care in handling. However, some of the more exotic boron hydrogen compounds are definitely toxic and do require care. Boron is never found in the elemental form in nature. It was first obtained by Moissan in 1895 by reduction of boric anhydride (B_2O_3) with magnesium in a thermite-type reaction (Moissan, Ann. Chim Phys 7:6, 296, 1895). This is still used for obtaining large quantities of impure boron. Highly purified crystalline boron is obtained by vapor phase reduction of the compound boron trichloride with hydrogen on electrically heated filaments in a flow system (Stern, Lynds, Journal of Electrochemical Society, 105, 676. 1958).