Product Data Sheet

Boric Oxide

B_2O_3
Diboron Trioxide
Technical Grade: 4-Mesh, 60-Mesh, and 200-Mesh

CAS Number 1303-86-2

Boric oxide, the pure form of B_2O_3, is a hard glassy material, granular in texture. Exposed to the atmosphere it slowly absorbs water, reverting to boric acid. It is soluble in water but at a much slower rate than boric acid. Approximately 56.3 kg of boric oxide are the chemical equivalent of 100 kg of boric acid.

Boric oxide is used where B_2O_3 is required without the presence of sodium or calcium and/or where water would be detrimental to the process.

Applications and benefits

Specialty glasses
Pure B_2O_3 is needed for the production of certain types of glasses including optical and telescope lenses, medical glasses (ampoules), electronic glasses and glass-ceramic composites. The general benefits of using B_2O_3 in glass formulations are reduction of melting temperature, increased thermal resistance and mechanical strength, and enhanced aqueous and chemical durability.

Specialty ceramics
Boric oxide is used to produce various types of high strength and heat-resistant ceramic products such as boron carbide, boron nitride, titanium and zirconium diborides, as well as elemental boron.

Refractories
It is used in the manufacture of chemically bonded firebricks and castables which require resistance to high temperature, abrasion and corrosion. Boric oxide is used as a binder for magnesia-based refractory bricks and as a stabilizer for dolomite refractory bricks commonly used in steel smelting furnaces.

Glazes and enamels
Boric oxide increases the strength, scratch resistance, and chemical resistance of ceramic wares such as wall and floor tiles, tableware and porcelain, and of enamelled appliances. Generally, boric oxide which has a capacity to increase yields is used for a combination of reasons, the final glaze or enamel benefiting from its influence on both the melting and physical properties of the product.

Chemical reactions
Boric oxide is used in the preparation of of element boron, boron halides, sodium borohydride, metallic borates, and borate esters. It is also used as a catalyst in the conversion and synthesis of many organic compounds.

Metallurgy
Boric oxide is an excellent solvent for metallic oxides at high temperatures. In the field of metallurgy, boric oxide is used in the preparation of special welding and soldering fluxes, in chemical-bonded refractories, in the hardening of steel, and in the production of alloys with iron, nickel or manganese. It is also used to produce amorphous metal and rare-earth magnets.

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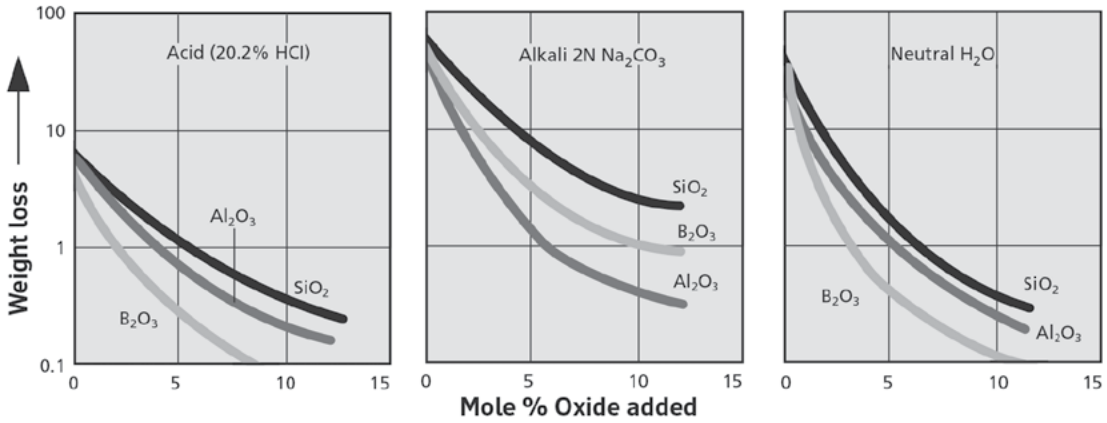
Boric oxide improves resistance of glass to aqueous and chemical attack as weight loss tests show.
From *Glass* by Horst Scholze, 1991.



Physical and chemical properties

The normal glassy form of boric oxide has no definite melting point. It begins to soften at about 325°C (617°F). Two crystalline forms can be obtained under high pressure. One of these can also be made at atmospheric pressure. The melting point of the latter has been reported as 450°±2°C if made at atmospheric pressure and 465°±10°C if made at high pressure.

Characteristics	
Molecular Weight	69.62
Specific Gravity	1.84
Melting Point	450-465°C (842-869°F)
Heat of solution (absorbed)	4.81 x10^5 J/kg (207 BTU/lb)

Stability

Boric oxide is a hygroscopic product. Care should therefore be taken to avoid exposure to water or humidity, as this may cause caking. If wetted it reacts exothermically, forming boric acid. Also, it is, of course, essential to maintain the integrity of the packaging.