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Borates in industrial fluids

Borates are well established and widely used in the manufacture of industrial fluids such as antifreezes, lubricants, brake fluids, metalworking fluids, water treatment chemicals and fuel additives. Borates' function in these fluids are:

- Corrosion inhibition
- Buffering action
- Freezing point reduction
- Boiling point elevation
- Lubrication
- Stabilization of thermal oxidation
- Prevention of sludge formation
- Reduction in moisture sensitivity

Applications

Antifreezes (engine coolant)
Glycol-based antifreezes can oxidize to produce corrosive organic acids in automotive coolant systems. The buffering action of borates keeps the pH above 7 – preventing acid formation and inhibiting corrosion.

Lubricants
Borate polyols and polyamines in lubricants form an extremely resilient film on metal load-bearing surfaces. This film improves load capacity and protects from wear and tear. Potassium borates are used in high pressure lubricants due to their stable dispersion of microspheres.

Brake fluids
Brake fluids are moisture sensitive. Absorbtion of water by the system reduces the boiling point of the fluid and can cause vapor-lock. Borates in brake fluids act to prevent vapor-lock.

Metalworking fluids
Borates act as bacteriostatic agents in metal cutting emulsions. They are also corrosion inhibitors. Boric acid esters have led to high quality water-miscible cutting fluids with longer emulsion charge life.

Water treatment chemicals
In heat exchange devices, any corrosion of metals or alloys can result in diminished heat transfer and, consequently, shorter service life. This is particularly true of central heating systems, cooling towers and circulating water systems. In the presence of oxygen, borates can promote the formation of a passivating layer (ferric oxide film) which prevents further oxidation.

Fuel additives
Borate esters have been used as gasoline additives to prevent pre-ignition, and help to keep carburetors clean. There has also been renewed interest in adding borate esters to gasoline for improving fuel efficiency.

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About Rio Tinto Minerals

Rio Tinto Minerals is the acknowledged world leader in developing industrial minerals – building blocks for life, and for products that contribute to better living – and in developing solutions to build its customers' businesses. The company supplies nearly half the world's demand for refined borates from its principal mine in California, and offers:

Minerals that make a difference – consistent product quality secured by ISO 9000:2001 registration of its integrated quality management systems

People who make a difference – world leaders in borate chemistry, technical support and customer service

Solutions that make a difference – Strategic Inventory Placement and long-term contracts with shippers to ensure supply reliability

About *20 Mule Team*® Borax products

20 Mule Team® borates are naturally occurring minerals that have an excellent reputation for safety when used as directed. Borates are essential nutrients for plants, part of a healthy diet for people, and key ingredients in fiberglass, glass, ceramics, detergents, fertilizers, wood preservatives, flame retardants and personal care products.

20 Mule Team® Borax products in industrial fluids:

Borax Decahydrate

***Neobor*® Borax Pentahydrate**

***Optibor*® Boric Acids**

Boric Oxide

Potassium Pentaborate

Potassium Tetraborate

Sodium Metaborate 4 Mol

Sodium Metaborate 8 Mol