

Borates in starch adhesives

Starch is a natural polymeric product and is found in almost every plant. Today, the principal sources of most commercial starches are maize, potato, tapioca and wheat. Adhesives derived from starch can be significantly improved by borate additives through:

- Increased viscosity
- Quicker tack
- Better fluid properties

Modifying the starch molecule

The chemical makeup of the starch polymer makes it a good adhesive, but for many industrial applications its tack is too slow and its viscosity too low.

If starch is treated with a hot aqueous solution of soda ash or caustic soda plus a borate compound, extensive chemical changes are brought about. Interchain linkages can be formed through the borate anion structure, resulting in a desirable modification of the starch's physical properties.

It is the change to a more highly branched chain polymer with higher molecular weight that improves the viscosity, tack, and fluid properties of starch adhesives.

Industrial applications

The starch and adhesive industry depends on unique characteristics imparted by the addition of borates in adhesives. Products and processes requiring starch adhesives include:

- Corrugated box board
- Paper bags (grocery and multi-wall)
- Paper boxes
- Carton sealing
- Case sealing
- Tube winding (paper and board)
- Laminated paper board
- Gummed tape
- Gummed paper
- Textile sizing



Part of Rio Tinto

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 starch adhesives:

***Neobor*[®] Borax Pentahydrate**

Borax Decahydrate

***Optibor*[®] Boric Acids**

Minerals that make a difference

www.riotintominerals.com