

# 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

## About the company

Rio Tinto Borax supplies nearly half the world's demand for borates from its principal mine in California. The company offers an integrated approach to mining, refining, and distributing borates, as well as:

- Strategic Inventory Placement and long-term contracts with shippers to ensure supply reliability.



**Neobor® Borax Pentahydrate**  
**Borax Decahydrate**  
**Optibor® Boric Acids**

- Acknowledged world leadership in borate chemistry and technology development that translates to unparalleled technical support for customers.
- Consistent product quality supported by ISO 9000 registered Quality Management Systems, statistical process control and Certificates of Analysis.

#### **About the products**

Borates are naturally-occurring mineral salts, essential for plant life and part of a healthy diet for people. Borate products have an excellent reputation for safety – and a long track-record of being safe when used as directed.

**Borax Asia Pte. Ltd.**  
501 Orchard Road  
#08-02 Wheelock Place  
Singapore 238880  
Tel: (65) 6738 6068  
Fax: (65) 6738 6282

**Borax Europe Limited**  
1A The Guildford Business Park  
Guildford, GU2 8XG  
United Kingdom  
Tel: (44) 1483 242000  
Fax: (44) 1483 242001

**U.S. Borax Inc.**  
26877 Tourney Road  
Valencia, California, 91355-1847  
United States  
Tel: (1) 661 287 5400  
Fax: (1) 661 287 5495

***A member of the Rio Tinto Group***

[www.borax.com](http://www.borax.com)