

# Borates in steel slag stabilization



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Steel slags with a basicity weight ratio ( $\text{CaO}/\text{SiO}_2$ ) of 1.5 or higher have a property whereby the dicalcium silicate ( $2\text{CaO}\cdot\text{SiO}_2$ ) undergoes a transformations as it cools. This forms a dusty slag material. (See top portion of diagram).

These dusty slags can be prevented with addition of boric oxide ( $\text{B}_2\text{O}_3$ ) as a slag modifier to the system, which creates a  $\beta\text{C}_2\text{S}$  polymorph form.  $\beta\text{C}_2\text{S}$  has a similar density to  $\alpha'\text{C}_2\text{S}$ , resulting in a stable rock-like material as shown in the bottom portion of the diagram.

## Description and dose rate

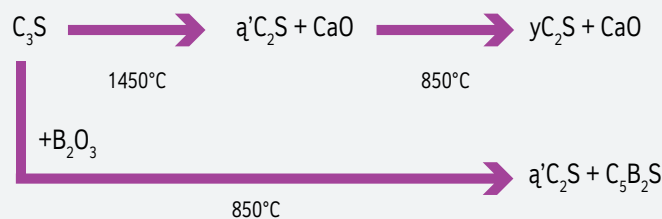
- *Dehybor*® is a 61%  $\text{B}_2\text{O}_3$  anhydrous borate product containing 30%  $\text{Na}_2\text{O}$
- One 25 kg bag of *Dehybor* per ton of slag. Optimization is recommended

## Benefits in slag

- *Dehybor* offers a low melting point ( $750^\circ\text{C}$ )
- Sodium oxide levels help reduce viscosity of the slag
- Fine glassy particles enables rapid melting
- More complete mixing of borate
- No risk of explosion (virtually no steam generation) due to water

## Value to you

- Less slag dust
- Easier to handle slag in the plant
- Revenue from saleable slag
- Savings on landfill taxes
- Savings on landfill disposal costs
- Savings on slag treatment costs
- Reduction in regulatory oversight due to better housekeeping practices
- Better community relations



C = CaO / S =  $\text{SiO}_2$  /  $\text{C}_3\text{S}$  = Tricalcium silicate /  $\text{C}_2\text{S}$  = Dicalcium silicate /  $\text{C}_3\text{B}_2\text{S}$  = Calcium borosilicate



## About U.S. Borax

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates—naturally-occurring minerals containing boron and other elements. We are 1,000 people serving 500 customers with more than 1,700 delivery locations globally. We supply 30% of the world's need for refined borates from our world-class mine in Boron, California, about 100 miles east of Los Angeles. We pioneer the elements of modern living, including:

- **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:** Experts 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® products

20 Mule Team borates are produced from naturally occurring minerals and have an excellent reputation for safety when used as directed.

Borates are essential nutrients for plants and key ingredients in fiberglass, glass, ceramics, detergents, fertilizers, wood preservatives, flame retardants, and personal care products.

*20 Mule Team Borax products in steel slag stabilization:  
Dehybor®*

