


Dehybor® in gold metallurgy

Dehybor® anhydrous borax is used in the gold refining industry as part of flux formulations to dissolve metal oxides, as well as being used as a flux in gold assaying

Gold ore types

Ore grades are divided into three fundamental divisions:

- Acid gangues which consist mainly of silica
- Basic gangues which are largely calcareous, including oxidizing ores with high contents of divalent metals (eg iron)
- Reducing ores such as pyrites

Borates are used in each of these ore types for:

- Facilitating attack of the ore at a lower temperature
- Making the slag more fluid at the furnace operating temperature—reducing viscosity

Refining of pure gold from bullion

Bullion ingots are melted in clay crucibles under an anhydrous borax cover. Oxygen is passed through the metal which then forms oxides of the impurities. These oxides dissolve in the *Dehybor* cover and produce a fluid borate slag. This slag is periodically removed and replaced with fresh *Dehybor*. Further refining steps are then carried out to produce bars which assay at least to 998 fine gold (ie 99.8% pure).

Addition rates of borate

The addition of *Dehybor* to the smelt is in the order of 10–50% of total smelt weight, depending on the process. The borax contribution to flux composition can be up to 60% of total flux weight but is typically around 30–40%.

Benefits of *Dehybor* use in gold refining

- The precious metal content is recovered with minimal loss to the slag
- Inclusion into basic fluxes for use on acidic ores promotes a substantial reduction in sintering temperature of the charge
- The powerful solvent effect on many oxides produces easily fusible borates

- Non-combustibility with minimum fuming tendency
- Formation of highly fluid slags with only mild attack on refractories
- Ease with which the slag can be thickened if necessary and slammed
- Avoids intumescence and puffing

Requirements of borates for fluxes

- Low impurities: Impurities delay smelting process in gaining temperature
- Consistent granulometry (like sugar grains): If the borate is too fine it will run into the electrodes and burn away; if too coarse, it melts too slowly
- To prevent “spit and crackle” problems, the flux should be anhydrous

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 650 customers with more than 1,800 delivery locations globally. We supply around 30% of the world’s need for refined borates from our world-class mine in Boron, California, about 100 miles northeast of Los Angeles.

About 20 Mule Team products

U.S. Borax produces the *20 Mule Team®* borates family of products from naturally occurring minerals and have an excellent reputation for purity and safety when used as directed. Borates are key ingredients in a number of industrial applications including fiberglass, glass, ceramics, batteries and capacitors, wood preservatives, and flame retardants.

High quality, high reliability, high performance borate products. It’s what we’re known for.