

**Abstract**  
**Product Performance**  
**Efficacy – 40 CFR 158.640**  
**Cobra™Rod**

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Cobra™Rod is a glass-like solid mixture of fused boron (boric acid & disodium octaborate tetrahydrate) and copper hydroxide. This glass-like product when compared to its crystalline ingredients acts as a slow release system for the boron and copper compounds. A laboratory study demonstrated a slower dissolution of Cobra™Rod than that of a similar EPA registered product that contains only boron. The increased longevity of the Cobra™Rod is ascribed to the formation of copper borate in the formation of the “fused” product.

Increased efficacy of boron (boric acid) against both wood decay fungi and several wood-boring insects by the addition of copper compounds was demonstrated in a review of the literature.

Cobra™Rod offers additional fungal and insecticidal (termites and other wood boring insects) efficacy over the presently registered 100% boron product due to the presence of the copper and the slower dissolution rate for Cobra™Rod.

The components of Cobra™Rod, disodium octaborate tetrahydrate, boric acid and copper hydroxide have been shown as effective control agents against decay fungi (wood-rot) and certain wood boring insects.

### **Fungal Efficacy**

Copper-borate mixtures (complexes) have been found effective against:

- Representative species of basidiomycets
- Representative species of placenta
- White-rot fungi
- Brown-rot fungi
- Soft-rot fungi
- Mold – (general classification)
- Decay fungi – (general classification)

Copper-borate mixtures (complexes) have been found effective against:

- Carpenter ants
- Wood-boring beetles
- Termites
  - Coptotermes
  - Reticulitermes
  - Zootermopsis

## Physical and Chemical Characteristics of Cobra™Rod

Cobra™Rod, a mixture of disodium octaborate tetrahydrate, boric acid and copper hydroxide, is a wood preservative. Cobra™Rod is currently registered in Canada as a remedial treatment for non-food contact wood for utility poles, posts, pilings, millwork, decks, and window joinery. It is similar to a product already registered both in the United States and Canada, Impel® Rod II (A.I. disodium octaborate anhydride). The difference between these products is the addition of a small amount of an additional active ingredient, copper hydroxide, to the Cobra™Rod.

Cobra™Rod is formulated to the glass-like product by fusing the ingredients at a high temperature. The product is a water soluble, dark blue-green, clear, hard glass-like rod with a bulk density of 2.16 g/cm<sup>3</sup>. This glass-like product when compared to its crystalline ingredients acts as a slow release system.

Disodium octaborate tetrahydrate (or anhydride) is chemically related to boric acid. The disodium octaborate tetrahydrate is slowly converted to boric acid in biological systems. In aqueous solutions at or near the physiological pH, boric acid is a stable, undissociated acid (weak). The release (solubility) of these ingredients and their conversion to “boric acid” is dependent on the amount of water/humidity, temperature, the pH of the environment and the size (surface area) of the glass-like rods.

Cobra™Rod contains a large excess of disodium octaborate tetrahydrate and boric acid (95+% of the ingredients) with similar chemical and toxicological properties. The acute toxicological characters for cupric hydroxide have similar values to those reported for the “borates” as all ingredients have relatively low acute toxicity potential. It is reasonable to expect that the acute toxicity characteristics of Cobra™Rod would differ only slightly, if any, from those of disodium octaborate tetrahydrate and boric acid. The presence of the copper ion mediates an increase in the efficacy and longevity of the product against both the wood decay fungi and wood boring insects (termites).

Based on the dissolution data presented in the POWERTECH LABS INC. report, “Evaluation of Cobra™Rod Wood Preservative Rods”, November 1997 (D. Cartlidge), the leaching of boron from Cobra™Rod under laboratory conditions is extended about three-fold compared to the 100% boron rods. Extended protection by the extended release plus the continued presence of copper in the wood provides at least a 30% increase in the time of protection by this product. Details of this project are presented in the POWERTECH LABS’ report, Attachment III.

## Conclusion

Cobra™Rod, a solid glass-like rod, is formulated (fused) at an elevated temperature. No inert ingredients are intentionally added to Cobra™Rod, the only inert ingredient(s) in the product are those associated with the active ingredients. Cobra™Rod is almost 98% active ingredients or only slightly more than 2% “inerts”. This glass-like fused product acts only as a slow release formula for the crystalline/powder components. This formulation causes little or no modification to the physico-chemico characteristics or the acute toxicological profile of the major component,

borate ion, (disodium octaborate tetrahydrate/boric acid). This formulation offers several advantages over a similar rod of 100% boron.

The fusion of boron and copper into copper borate enhances the mobility of the copper within the wood while the leaching of boron from wood is delayed. These characteristics will extend the fungal efficiency of preservative treatment by delaying the loss of boron and by the presence of the copper in the wood long after the boron has been depleted. This difference will be significant in the wetter climatic areas where leaching of boron from the treated wood is significant. This formulation demonstrates even greater longevity of efficacy when compared to a simple admixture of the crystalline/powder materials by acting as a slow release formulation.

Review of literature indicates that the boron-copper formulation as in Cobra™Rod increases the fungal and pesticide efficacy as compared to either of the individual components. Fungal efficacy will be increased due to the synergistic effects of copper and boron. The boron offers protection against internal attack of treated wood for copper tolerant fungi and insects where as the copper offers protection to the outer surfaces of the treated wood against attack by boron tolerant soft-rot fungi.

The copper borate (boron/copper) formulation has several advantages in the protection of wood against decay fungal and insect attack including increased efficacy of the formulation and increased longevity of the product, slow release of the active ingredients, as compared to the 100% boron rods currently registered.

-- *W. Wall, Vice President, Development  
Genics Inc.*

## References

1. D.J. Cartlidge, "Evaluation of CobraRod™ Wood Preservative Rods", POWERTECH LABS INC. Project 6325-44-02. Prepared for Genics Can Inc., Nov. 1997

Selected from "The Second International Conference on Wood Protection with Diffusible Preservatives and Pesticides", 1996.

2. L.W. Rowlett, "The Use of Diffusible Preservatives for the Prevention and Control of Wood-Boring Beetles, Carpenter Ants and Decay Fungi", pg. 35-37.
3. K. Grace, "Review of Recent Research on the Use of Borates for Termite Prevention, pg. 85-90.
4. M.J. Manning, J. Lloyd, M. Schoeman, "The Future of Diffusible Preservative and Pesticide Systems", pg. 157-165.
5. V.R. Palmere, "The Resistance of Bora-Care Treated Wood to Subterranean Termite Feeding and Tubing", pg. 183-184.