UPDATE - ARSENICAL CREOSOTE NEW WOOD PRESERVATIVE

by

John Krzyzewski

Canadian Patent 1174004 for an arsenical creosote system (Creoblend) was granted September 11, 1984, for a simple mixture of creosote and inorganic salts using ammonia, water and petroleum oil as cosolvents.

Composition and Properties

Creoblend is extremely stable and homogeneous. The treated wood remains clean (samples were shown) and the creosote is non-bleeding. The original formulation (shown in slide) consisting of 50 percent creosote and 4 percent copper arsenate remained stored in an unheated garage in Ottawa, Canada, during the extremes of winter cold and summer heat for over 8 years. This solution is still holding with no signs of separation.

The basic mixture of creoblend (CBD) consists of equal volumes of creosote, petroleum oil, and 26 percent ammonia water. These components are simply blended together and the stable mixture results as shown. Any petroleum oil like furnace oil, diesel, pole treating oil, etc. can be used, either alone, or as a carrier for soluble organic toxicants like copper naphthenate. The proportions of the basic components can be varied over a wide range. The creosote can range from 6 to over 55 percent; the petroleum oil, from 6 to over 25 percent; the ammonia as NH3 from 4 to 8 percent; and the remainder is water. Early test solutions contained from 0.5 to 5 percent salts such as copper arsenate, copper meta borate, copper carbonate, either alone or mixed with zinc oxide. All were solubilized in ammonia water and a few water soluble salts were also tested for solubility in solutions. As shown by the addition of 25 percent (vol) water, the CBD has a very high capacity for absorption of excess water without disturbing the stability.

Homogeniety

Homogeneity of solutions was tested by the chromatographic spread of liquid placed (with an eyedropper) on No. 40 Whatman filter paper. As shown, for non-homogeneous liquids like the mixture of creosote and water, or creosote and ammonia water, the water-phase spreads immediately in rapid advance of the creosote. For the homogeneous CBD which was stored for some years, the spread of solution is uniform as confirmed by the uniform color of the stain on the filter paper.

Water Repellency

CBD at a low retention is highly water repellent as indicated by the "water-contact-angle" test. The water drops were applied with

an eyedropper to the end-grain of red pine sapwood treated blocks (19 mm, 3/4 in. cubes). The end-grain is very absorbent. The untreated block absorbed the water within 2 minutes of test. The water drops remained perfectly intact (fig. 4) on the blocks treated to 10 pcf (160 Kg/m3) creosote, and CBD treated to 5 pcf (80 Kg/m3) creosote plus 0.2 pcf (3.2 Kg/m3) copper salts, for the standard test period of 2 hours duration.

Water absorption

Water absorption (as opposed to water repellency) tests were also carried out. Red pine sapwood blocks of 19 mm cubes were soaked for 70 minutes in water (140 mL. per block). The blocks were weighed periodically to determine the rate of uptake.

Three series were tested. One was treated to 10 pcf (160 Kg/m3) creosote. The second set, to 7.3 pcf (117 Kg/m3) of pole treating oil (to stimulate the usual penta pole treatment). The third set was treated with CBD to 5.3 pcf (85 Kg/m3) creosote plus 0.1 pcf (3.2 Kg/m3) copper salts.

The water absorption (Fig. 1) is compared at the 60 minutes soaking time. The creosote absorbed 1.5 times, the pole treating oil, 2.4 times, and the untreated wood, 3.5 times as much as the CBD treated blocks.

Pressure Impregnation

CBD was also stable under normal treating pressures and temperatures of 140 F (60 C) when tested for impregnation of white spruce heartwood square timbers. One charge was treated with CBD and another with ammoniacal copper arsenate (CAA). In early tests, the CAA had shown remarkably good depth of penetration in refractory heartwood such as that of white spruce.

The treated timbers were inspected by an independent examiner. Timbers were sawn at mid-point and passed over a rotating planer to preclude the spread of preservative by the saw blade. Comparisons of depth of penetration were based on "quartile" depth of penetration measurements and the proportion of cross section penetrated was measured with a planimeter.
The quartile average depth of penetration for the CAA treated timber was 13.2 mm, and 13 minimum points had an average of 5.2 mm (fig. 2). The corresponding depth for the CBD treated timber was 16.8 mm (27 percent greater), and 9.8 mm (88 percent greater) for 5 minimum points (fig. 3). These timbers were incised and the CBD penetrated beyond the depth of the incisions.

The planimeter test showed: 45.0 percent of cross section penetrated for the CAA treated timber, and 54.5 percent for the CBD treatment.

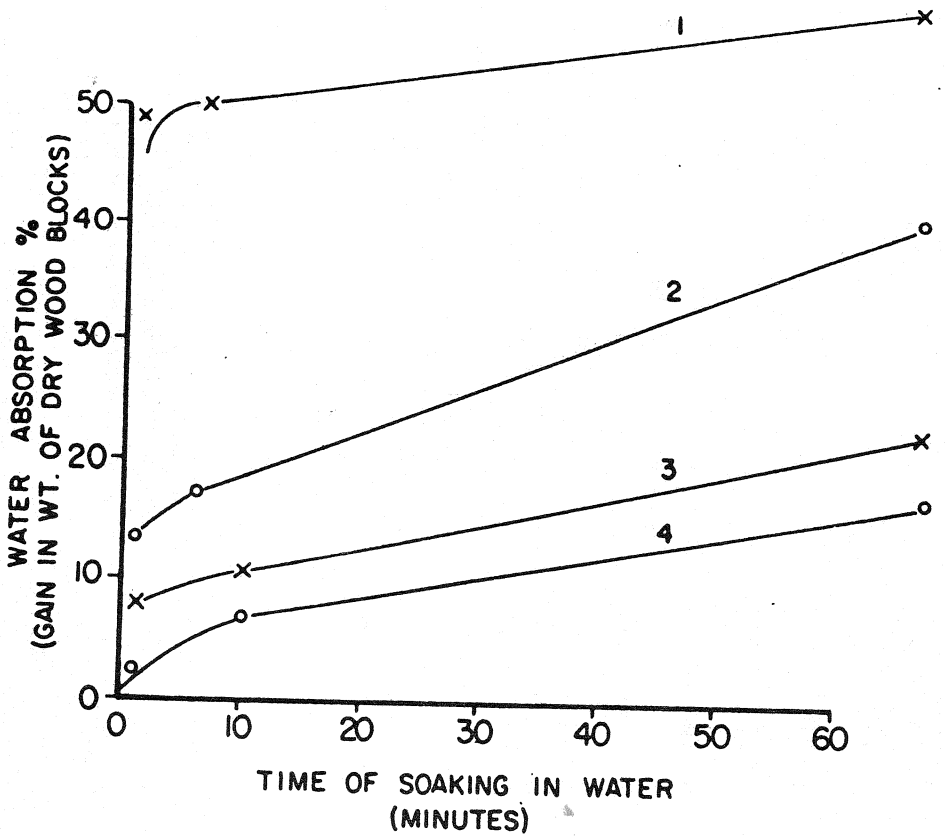
Concluding remarks

The long-term stability and all the tests conducted indicate that Creoblend has excellent properties for the preservative treatment of a variety of wood products. It has a very high capacity for

absorption of free water either in the wood being treated, or in contaminated solutions.

It is expected that permeable species used for marine timbers could be treated with creosote and arsenic salts in a single impregnation cycle. Creoblend consisting of 55 percent creosote and 3.0 percent arsenate salts impregnated by the full-cell process would deposit sufficient creosote and arsenic salts to meet requirements for use in marine timber treatments.

The creoblend patent is open for inspection, licensing, test trials, and use in industrial tests. The series of 30 slides and recorded commentary can be obtained by contacting the author in Ottawa, Canada.



1 – UNTREATED CONTROL

2 – POLE TREATING OIL AT 7.3 PCF. NET

3 – CREOSOTE ALONE AT 9.5 PCF. NET

4 – AMMONACAL PRESERVATIVE/CREOSOTE/OIL AT 5.3/0.1 PCF NET

FIG. 1

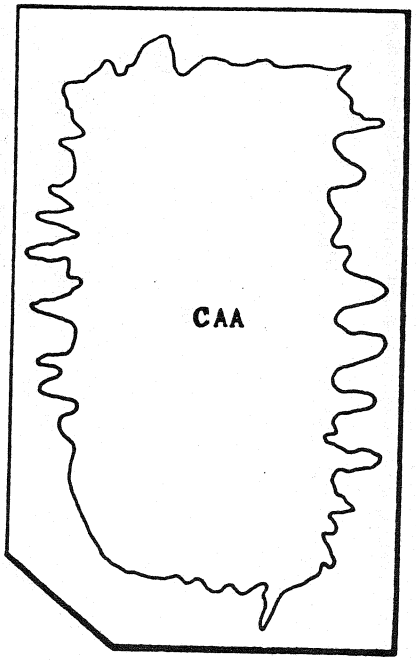


FIG. 2

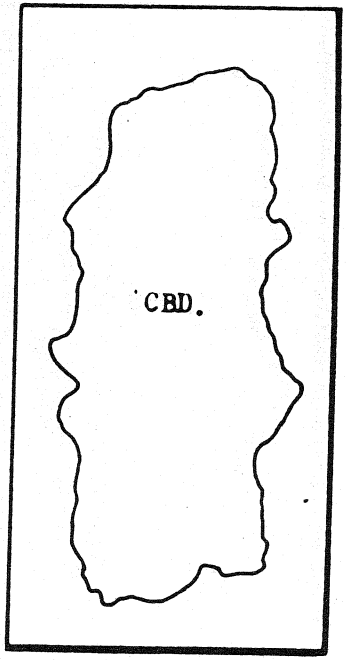


FIG. 3

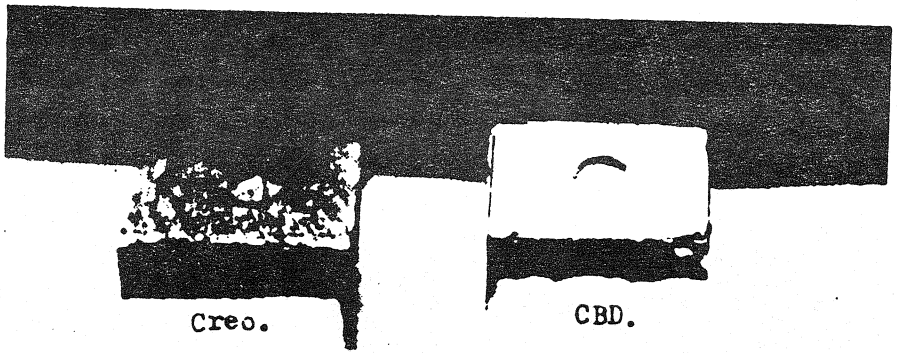


FIG. 4