Copper Chrome Arsenic (CCA) wood preservative

Dr. Harry Greaves, Wood Products Consultant

CCA is a well-established preservative invented by an Indian engineer in 1933, with a British patent granted for its use a year later. It is used in all countries around the world where wood preservation plays an important part in building and associated infrastructure. CCA is a water-based preservative used to protect timber in service from attack by decay fungi, wood boring insects, termites, and marine borers.

There are many variations of the CCA formulation. In Australia CCA preservative must conform to the Australian Standard AS1604.1 - 2012 Specification for preservative treatment. Part 1: Sawn and round timber, with the following specifications for the elemental ratios:

Copper	Chromium	Arsenic
23 – 25%	38 – 45%	30 – 37%

When the active elements Cu, Cr, and As are introduced into the timber, the formulation is designed so that they react with each other and with the wood structure to become fixed as insoluble compounds. The fixation mechanism depends on such factors as temperature, relative humidity, time, pH (acidity), the actual formulation of CCA used, etc. If the treatment plant operator does the job well, no timber should leave the premises until the chemicals have been fully reacted. In other words, there should be no unfixed chemicals in or on the surface of treated timber, and therefore very little leaching of elements into the environment from the timber when it enters service. This fixation characteristic of CCA preservative is critical to its acceptance in our environment as it ensures that none of the individual elements pose a risk through loss to air, soil, or water when properly applied to timber.

Today, most CCA-treated timber is produced by processes that accelerate the fixation process, leaving the timber surfaces clean and relatively dry.

Treatment plants use CCA in accordance with the Australian Standards and environmental guidelines. In addition, good practices are set down in the WorkSafe Australia documents. The CCA formulations themselves and associated health and safety data are described in *Material Safety Data Sheets* issued by the manufacturer.

Most of the health and safety related concerns about using CCA focus on the arsenic and, to a lesser extent, the chromium. Both elements are viewed as potentially harmful to human health, but as far as the public is concerned, this relates to the use of treated wood, whereas during the production of treated commodities the work force is concerned with the CCA chemicals themselves.

The hazards to health from CCA-treated timber are low. Furthermore, research has shown that the amount of As, for example, present in some common foodstuffs can be at levels higher than those detected by analysing the washings from scrubbed surfaces of CCA-treated timber (see below for further comment). Also, it has been shown that both animals and humans can detoxify As following ingestion.

CCA-treated timber (as opposed to the liquid CCA preservative) contains chemical forms of both Cr and As that are considered less toxic to humans than those elements found in other industries, e.g. smelting, tanning, chrome plating. On the other hand, a potential hazard to people working with CCA-treated timber may arise if treated sawdust or treated wood splinters enter the body and the local cellular environment releases the fixed chemicals. To avoid this, it is recommended that simple precautions are taken, i.e. the wearing of dust masks, gloves, and eye goggles. (Even if the timber were untreated, it would be wise to avoid breathing in sawdust or wood particles generated by any work). CCA-treated timber wastes should not be used as fuel in open fires, or for barbecues; it should be disposed of at approved landfill sites or by controlled incineration.

Properly treated CCA impregnated timber does not represent a health hazard and should be relatively free of surface deposits, dry, and the chemicals well locked into the wood cell structure. It should be handled to eliminate the low risk posed by even the smallest amount of surface deposits. In any event, such deposits are low when compared to many other sources of As in our environment such as the quantities found in some shellfish, some meats, some wines and, in many parts of the world, in drinking water.

Although some leaching may occur from various CCA-treated timber commodities over various time periods under specific conditions, the quantities leached are insignificant in terms of health issues and in some instances, the expected background levels. The most rapid losses and greatest amounts occur when the commodity enters service.

Studies in the USA have indicated that health effects from direct exposure to CCA-treated timber surfaces in decks or playgrounds are unlikely. When wood samples from major U.S. playground equipment manufacturers were tested for dislodgeable arsenic, most of the samples had levels below the detection limit. Other wipe studies of dislodgeable arsenic from old playgrounds, municipal playground surfaces and support poles, have confirmed this observation.

The Australian preservation industry has for some time offered alternative chemicals to CCA for the treatment of many commodities, including those for residential and domestic consumption. These alternative preservatives contain no arsenic or chromium and are approved and incorporated in national Standards. They are effective and may be used instead of CCA if the consumer so desires. They include ACQ, Copper Azole, and LOSP formulations (the latter are not suitable for ground contact end use).

Further information may be obtained from the author and the Timber Preservers Association of Australia (TPAA).

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