

## Assessing the Release of Copper from Nanocopper-treated and Conventional Copper-treated Lumber into Marine Waters II: Forms and Bioavailability

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### ABSTRACT

One application of nanocopper is as a wood-preserving pesticide in pressure-treated lumber. Recent research has shown that pressure-treated lumber amended with micronized copper azole (MCA), which contains nanosized copper, releases copper under estuarine and marine conditions. The form of copper released (i.e., ionic, nanocopper [1–100 nm in size]) is not fully understood but will affect the bioavailability and toxicity of the metal. In the present study, multiple lines of evidence, including size fractionation, ion-selective electrode electrochemistry, comparative toxicity, and copper speciation were used to determine the form of copper released from lumber blocks and sawdust. The results of all lines of evidence supported the hypothesis that ionic copper was released from MCA lumber and sawdust, with little evidence that nanocopper was released. For example, copper concentrations in size fractionations of lumber block aqueous leachates including unfiltered, 0.1  $\mu\text{m}$ , and 3 kDa were not significantly different, suggesting that the form of copper released was in the size range operationally defined as dissolved. These results correlated with the ion-selective electrode data which detects only ionic copper. In addition, comparative toxicity testing resulted in a narrow range of median lethal concentrations (221–257 mg/L) for MCA lumber blocks and  $\text{CuSO}_4$ . We conclude that ionic copper was released from the nanocopper pressure-treated lumber under estuarine and marine conditions. *Environ Toxicol Chem* 2018;9999:1–11. Published 2018 Wiley Periodicals Inc. on behalf of SETAC. This article is a US government work and, as such, is in the public domain in the United States of America.

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