

Transformation and release of Micronized Cu used as a Wood Preservative in Treated Wood in Wetland Soil

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Abstract

Micronized Cu (μ -Cu) is used as a wood preservative, replacing toxic Chromated Copper Arsenates. Micronized Cu is Malachite [$\text{Cu}_2\text{CO}_3(\text{OH})_2$] that has been milled to micron/submicron particles, many with diameters less than 100 nm, and then mixed with quat or azol biocides. In addition to concerns about the fate of the Cu from μ -Cu, there is interest in the fate of the nano-Cu (n-Cu) constituents as μ -Cu treated wood frequently contacts the ground. We examined movement of μ -Cu from treated wood after placing treated wood stakes into model wetland ecosystems. Release of Cu into surface water and deep soil leachate was monitored. After 5 months, Cu in thin-sections of treated wood and adjacent soil was localized and characterized with X-Ray Absorption Spectroscopy (XAS). Surface water Cu reached maximum levels 3 days after stake installation and remained elevated. Sequential filtering indicated that some of the Cu in solution was associating with soluble organics, but there was no evidence for n-Cu in solution. Deep leachate Cu levels were 10% of surface water levels at day 3 and increased gradually thereafter. Localization and speciation of Cu in the wood and adjacent soil using XAS, clearly indicated that Cu concentrations in the treated wood decreased, and increased in the adjacent soil. However, n-Cu from the treated wood was not found in the adjacent soil. These results indicate that Cu in the μ -Cu treated wood dissolves and leaches into adjacent wetland soil and waters primarily in ionic form (e.g., Cu^{2+}) and not as nano-sized Cu particles.