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Utilization of copper nanoparticles on preservation of radiata pine wood: leaching analize

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Statement of the Problem: Wood is a heterogeneous and hygroscopic material, which is of lignocellulosic nature and thus is susceptible to biological degradation by fungi, insects and termites. Therefore, methods to improve the durability of wood have been developed since early times and the chemical preservation of wood products appears to be the most common and developed strategy. On a constant search to evaluate new preservative systems that help prolong the useful life of wood, the applying nanotechnology to wood treatments is considered one alternative attractive. This objective of this study is to analyze the impregnation of copper nanoparticle solutions in Pinus radiata wood and its behavior under leaching tests. Methodology & Theoretical Orientation: Sample 5×2×1.5 cm was prepared from sapwood portion of Pinus radiata wood according with EN113 standard. The samples were impregnate with 1 and 3 g/l aqueous copper nanoparticle solutions in a pressure vessel by the Rueping (empty cell) process with initial and final vacuum. The pressure of impregnation was at 6 bar for 2 hours, simulant industrial process. The leachate test was carried out according to the AWPA (E11-16). Findings: In the impregnation process, the retention of the copper nanoparticles in the treated samples was 0.64 and 2.08 kg/cm3, for 1 and 3 g/l respectively. When subjected to the leachate test, their leaching values were 35 and 14%, respectively. Analyze by SEM-EDS detected copper nanoparticles in lumen of fibers, indicated portion of free copper in wood. Conclusion & Significance: The copper nanoparticles showed good performance when subjected to wood impregnation process. The retention and leaching values presented are similar to those reported for other materials, however more studies are being developed to improve the application of nanotechnology on wood preservation

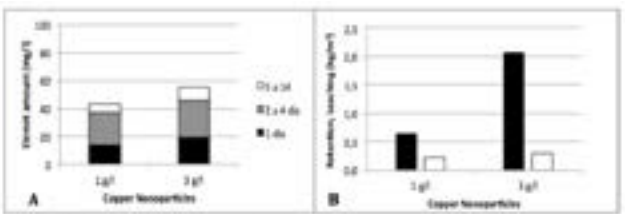

Figure 1. A: Amount of element leached out from *Pinus radiata* wood samples, 1st day at 14th day. B: Retention and leaching of Cu nanoparticles in impregnated pine samples, black bar retention counted from nanoparticle concentration in water solution, white bar leaching of nanoparticles.

Biography

María Graciela Aguayo has her expertise in wood chemistry, kraft pulping, nanocellulose and biomaterials. Currently, she is an academic at the University of Bí o-Bío, Concepción, Chile. She is a researcher at the Biomaterials and Nanotechnology Center in a research project "Cellulose nanocrystals obtained by hardwood pulps hydrolysis: characteristics and properties to improve biocide fixation in wood preservation".

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