A Green and Novel Technology to Recover Copper and Wood from Treated Wood Waste, Part II

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The US consumes approximately 70 million pounds of copper and produces about 580 million cubic feet of treated wood annually. Burning and reusing treated wood waste are disallowed by the US EPA due to health and environmental concerns. Vast quantities of copper and wood are disposed by landfill annually. Two promising extraction systems: citric acid and ammonium citrate were identified in Part I of this study. In this follow up study, the effects of extraction conditions such as time, temperature, and equilibrium copper concentration in the extraction solutions were determined. Both systems were found to be able to remove more than 95% of copper for either 8 hour at ambient temperature or 4 hour at elevated temperature (40C). The resulting solution can be used in consecutive extractions with fresh batches of waste wood until the copper reaches its rate limiting stage. The study demonstrated that copper in both extraction solutions was able to be electroplated onto the desirable metal surfaces thus efficiently recovered. This process also regenerated aqueous solutions to go back for reuse in extraction. A chemical engineering process flowchart for extracting copper from treated wood wastes using safe and low cost citric acid and ammonium citrate, recovering copper from the extraction solution by electroplating, and cyclic use of regenerated aqueous solution for extraction has been developed. The green, novel, effective, and practical technology developed from this research has the potential to prevent millions pounds of copper and wood from landfill and bring tremendous social, economic and environmental benefits.

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