

Field: MAT

Reduction of Cu^{2+} ions removed from laboratory waste using carboxymethyl cellulose film

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Keywords: (Materials, Natural Polymers, Redox, Waste Management).

Highlights

Reduction of Cu^{2+} ions removed from laboratory waste through adsorption on carboxymethyl cellulose film and thermal post-treatment at 170 °C and 200 °C in air.

Abstract

This study aims to recover copper from laboratory waste containing Cu^{2+} ions through adsorption and post-reduction via thermal treatment. Carboxymethyl cellulose (CMC) and CMC-glycerol (10%) films were immersed in synthetic CuSO_4 solutions (80 g/L). After 12 hours contact with the solution and drying in an oven with an air atmosphere, at 60 °C, each dried film was heated for 20 min in air, at 170 °C or 200 °C, temperatures below the degradation point of CMC. Compared to the controls (films without copper), an intense color change was observed in the copper-containing materials, as shown in Figure 1a. X-ray diffraction (XRD) patterns indicated the reduction of Cu^{2+} to Cu^0 and Cu^{1+} (Figure 1b), possibly due to the oxidation of CMC and glycerol hydroxy groups. This effect was also observed at room temperature, but at a slower rate. Research is ongoing to confirm the proposed mechanism for the observed phenomenon.

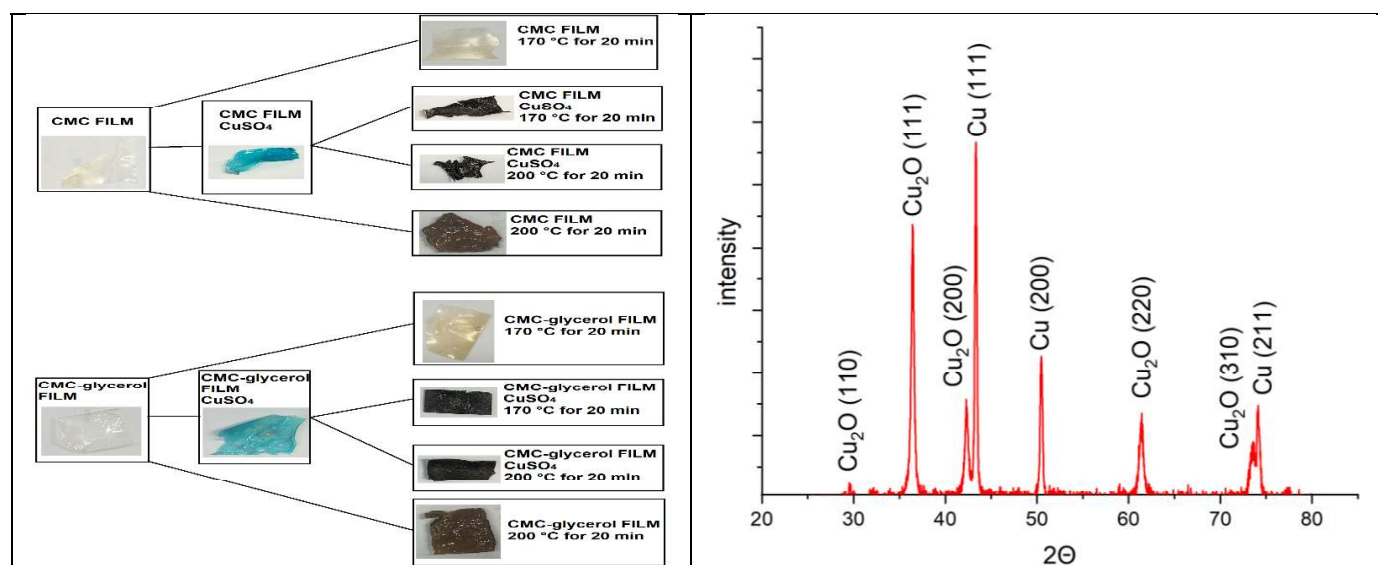


Figure 1. (a) Digital photographs of CMC and CMC-glycerol films before and after heating at 170 and 200 °C. (b) XRD pattern obtained for the CMC-glycerol film treated at 200 °C.

Acknowledgments

The authors acknowledge financial support from CNPq and FAPESP. Matheus L. M. Amorim thanks the USP Unified Scholarship Program – Project 733 for the granted scholarship.