

Effect of acrylamide concentration on adsorption of paraquat pesticide onto PAAm-MC hydrogels

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Environmental pollutants in water caused by waste products from industries increased the need of novel polymeric materials with the purpose of removing and separating toxic heavy metal ions through complexation and ion exchange mechanisms [1]. Researchers have exploited many biodegradable and effective adsorbents obtained from natural resources for the removal of contaminants (dyes, heavy metals, pesticides) from aqueous solutions [2]. Particular attention has been paid to hydrogel [3]. The objective of this work was to study the effect of acrylamide concentration on capability of hydrogels constituted by poly(acrylamide) (PAAm) and methylcellulose (MC) for removing paraquat dichloride from aqueous solution using UV-Vis technique. PAAm-MC hydrogel was obtained by acrylamide (AAM) monomer polymerization in aqueous solution in the presence of MC, N-N'-methylene-bisacrylamide (cross-linker) and N,N,N',N' tetramethylenediamine (catalyst agent). The AAM concentration ranging set at 3.6, 6.0 and 9.0 % (in-wt) with constant MC concentration (0.5 in-wt %). Results showed that the concentration of AAM was an important factor that affected the maximum amount of paraquat adsorbed (q_{eq}). The q_{eq} values decreased when the AAM concentration increased: 13.1, 8.9 and 6.7 mg g⁻¹ for hydrogels synthesized with 3.6, 6.0 and 9.0 % AAM, respectively. The adsorption trend in these hydrogels is that greater compaction decreases the paraquat adsorption capacity. These results suggest that PAAm-MC hydrogels are potential materials that can be applied as absorbents for removal of contaminants materials from aqueous solution.

Keywords: Hydrogels, poly(acrylamide), methylcellulose, paraquat adsorption.

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[1] E. Kok Yetimoglu, M.V. Kahraman, O. Ercan, Z.S. Akdemir, N. Kayaman Apohan, *React. Funct. Polym.* **67**, 451 (2007).

[2] J.-Z. Yi, L.-M. Zhang, *Bioresource Technol.* **99**, 2182 (2008).

[3] B. Singh, D.K. Sharma, A. Gupta, *J. Hazard Mater.* **154**, 278 (2008).

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