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Oxidized cellulose reinforced silica gel: New hybrid for dye adsorption

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Abstract

A benign dicarboxylic cellulose/silica hybrid was synthesized through periodate-chlorite oxidation of cellulose followed by in-situ silica network formation through sol-gel process. The crosslinked 2, 3 dicarboxylic cellulose/silica hybrid showed a homogenous morphology and the internal structure shows rod-like structure for 2, 3 dicarboxylic cellulose with ~ 5 nm in width. The current hybrid was investigated as a new adsorbent for methylene blue (MB) adsorption from aqueous solution. The adsorption data was best represented by pseudo-second-order model and Langmuir isotherm model. The maximum adsorption is 526 mg/g according to Langmuir fitting. The obtained results suggested potential applications of dicarboxylic cellulose/silica hybrid for the efficient removal of MB from contaminated wastewater.

Keywords: Oxidized cellulose – Sol-gel preparation – Composite materials – Dye removal

1. Introduction.

Higher consumption of synthetic dyes for many industrial applications has led to generating hazardous wastes [1]. Synthetic dyes can cause sever damages to human beings and affect the aquatic ecosystem even at low concentrations [2]. Many attempts have been carried out to develop new sustainable, efficient and cost-effective

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