



Preparation and characterization of imino diacetic acid functionalized alginate beads for removal of contaminants from waste water:

I. methylene blue cationic dye model

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Received 29 July 2010; Accepted 22 December 2011

ABSTRACT

This study deals with the development of a clean and safe process for water pollution remediation. We studied the potential use of Imino Diacetic Acid (IDA) activated calcium alginate beads for removal of cationic dyes from colored effluents in dynamic batch mode. Methylene blue (MB) has been chosen as a dye model for the study. The parameters that affect the beads surface modification process such as *p*-benzoquinone (PBQ) and IDA concentration, reaction time, pH, temperature and finally cross linking time in calcium chloride solution were studied. Maximum percents of dye removal are about 65% and 90% were achieved at initial MB concentration of 50 mg l⁻¹ after 60 min of adsorption at temperature (22 ± 1°C) for calcium alginate and IDA activated calcium alginate beads respectively. Surface modification reduces the competitive action of calcium ions especially at high bead's crosslinking degree. Removal percentage was doubled using modified alginate beads cross linked for 120 min at 2% CaCl₂. In conclusion, the modified alginate beads show higher affinity towards MB adsorption where removed 80% of the dye content after only 10 min compared with 48% for the unmodified beads. Regeneration of the beads was also tested and fast process was observed which provide us with possibility of reuse.

Keywords: Dye removal; Alginate beads; Adsorption; Methylene blue; Surface modification; Hydrogel

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