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Guar gum-*crosslinked*-Soya lecithin nanohydrogel sheets as effective adsorbent for the removal of thiophanate methyl fungicide

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Abstract

Rapid increase in use of fungicides for the agricultural and industrial purposes has marked the deterioration of water resources which ultimately affects the human life. Accordingly, various attempts have been made in the removal of these noxious compounds. In the same context, we are presenting biopolymers based nanohydrogel sheets; guar gum-*crosslinked*-Soya lecithin nanohydrogel sheets (GG-*crosslinked*-SY NHS) used for the effective removal of a fungicide; thiophanate methyl from aqueous solution. Guar gum and soya lecithin were employed as the biopolymers in the fabrication of nanohydrogel sheets due to their non- toxic nature, easy availability, cheapness and significant properties. Due to the presence of highly reactive functional groups onto the surface of GG-*crosslinked*-SY NHS, good adsorption results have been obtained. Maximum adsorption capacity of 59.205 mg/g was observed with 20 mg GG-*crosslinked*-SY NHS and 25 ppm thiophanate methyl solution concentration as calculated from the Langmuir isotherm. Results showed that neutral pH favoured the adsorption process. Kinetics results were indicative of the physical interactions between the thiophanate methyl and GG-*crosslinked*-SY NHS surface. Thermodynamic results have shown the spontaneous and endothermic adsorption process.

Keywords: Guar gum; Nanohydrogel sheets; Adsorption; Thiophanate methyl; Biopolymers

1. Introduction