

# Evaluation of Activated Alginate-GO Beads for Removal of Pharmaceuticals from Water

Graduate

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## Objectives

The objective was to analyse Ca-Alg<sub>2</sub>/GO beads as an adsorbent, testing the effect of agitation time, initial concentration, pH and temperature on the adsorption of methylene blue, famotidine and diclofenac onto Ca-Alg<sub>2</sub> and Ca-Alg<sub>2</sub>/GO beads.

## Methods | Experiences | Results

Carbonaceous materials have attracted significant attention for applications like pollutant removal due to a high specific surface area and adsorption capacity. Among several methods available to remove pollutant from water, adsorption seems to be cheap and highly effective. Ca-Alg<sub>2</sub>/GO beads were investigated as an adsorbent for two pharmaceuticals, Famotidine (FMTD) and Diclofenac (DFC), and a dye, Methylene Blue (MB).

The initial concentration, adsorbent dose, pH and temperature were all seen to play an important role in the adsorption. The Langmuir adsorption isotherm fitted the experimental data for each compound best, with maximum adsorption capacities of 1334.0, 35.5 and 36.4 mg·g<sup>-1</sup> for MB, FMTD and DFC respectively with Ca-Alg<sub>2</sub>/GO<sub>20</sub>. An analysis of the adsorption kinetics showed that the pseudo-second-order model fit with the experimental data for MB and FMTD and best for DFC. The adsorption was found to be exothermic and spontaneous. Desorption studies indicate that HCl 0.1 M was the best to elute MB from the beads with an efficiency up to 89%.

This work demonstrates that Ca-Alg<sub>2</sub>/GO beads are an efficient adsorbent and could be used in drinking or wastewater treatment plants in order to reduce the concentration of hazardous organic pollutants

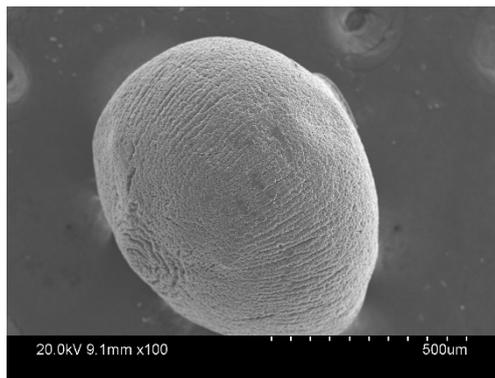
## Bachelor's Thesis | 2016 |

Degree programme  
*Life Technologies*

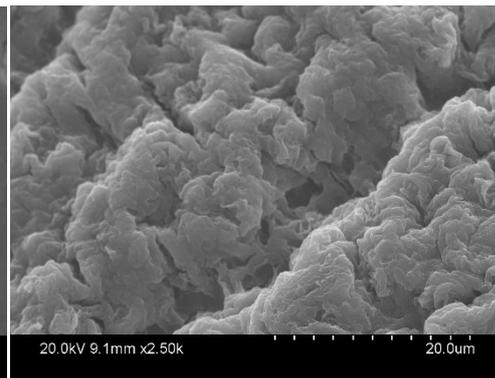
Field of application  
*Biotechnology*

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SEM image of Ca-Alg<sub>2</sub>/GO<sub>20</sub> dried bead, with a magnification of 100 times and an accelerating voltage of 20 kV.



SEM image of Ca-Alg<sub>2</sub>/GO<sub>20</sub> dried bead, with a magnification of 2500 times and an accelerating voltage of 20 kV.