Feasibility of cheese whey as an energy source for the growth of Aspergillus sp. and for the removal of heavy metals in batch reactor

Reena Pundir*, M.G. Dastidar

Centre for Energy Studies, Indian Institute of Technology, Delhi Hauz Khas, New Delhi 110016, India, Tel. +91 09536359779; Fax: +91 11 26581121; email: reenaspundir@gmail.com (R. Pundir), Tel. +91 09868118001; Fax: +91 11 26581121; email: mgdastidar@gmail.com (M.G. Dastidar)

Received 21 January 2014; Accepted 12 July 2015

ABSTRACT

In the present work, batch biosorption of Cu, Zn, and Ni ions by Aspergillus sp. was investigated. The effect of initial metal ion concentration (0–500 mg/l), pH (2.0–6.0), inoculum concentration (v/v), and different concentrations of total sugar in cheese whey (2, 4, 6, 8, and 10 g/l) on the biosorption of Cu, Zn, and Ni was studied separately. In the absence of metals and at pH 5, a maximum concentration of 5.62 g/l of biomass was observed. However, a decrease in the concentration of biomass was observed in the presence of Cu, Zn, and Ni. The concentration of Cu, Zn, and Ni was increased from 50 to 500 mg/l, and the maximum specific uptake was found to be 9.4 ± 0.15–62.2 ± 0.20 mg/g, 9.5 ± 0.1–64.0 ± 0.25 mg/g, and 7.2 ± 0.2–29.43 ± 0.08 mg/g, respectively. The biomass concentration increases with the increase in total sugar concentration in cheese whey. Scanning electron microscopy and X-ray Energy Dispersion Analysis depicted the possible cell–metal ions interaction.

Keywords: Biosorption; Heavy metal; Cheese whey

*Corresponding author.