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Praisy Terangpi, Saswati Chakraborty, Manabendra Ray

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Improved removal of hexavalent chromium from 10 mg/L solution by new micron sized polymer clusters of aniline formaldehyde condensate

Praisy Terangpi[a], Saswati Chakraborty[b*] and Manabendra Ray[c*]

[a]Centre for the Environment, Indian Institute of Technology Guwahati, Assam-781039, India. [b]Department of Civil Engineering, Indian Institute of Technology Guwahati, Assam-781039, India. [c]Department of Chemistry, Indian Institute of Technology Guwahati, Assam-781039, India.

Abstract

Removal of hexavalent chromium by aniline-formaldehyde condensate polymer coated on silica gel, in the past, showed poor removal at low concentration range with high adsorbent dose (~30% removal at 10 mg/L with a adsorbent dose of 8 g/L). We have now synthesized a new form of the support less polymer which brings down residual concentration to less than 1 mg/L with a 2 g/L dose. The maximum removal of total chromium was observed between pH 3-8 (94-98% removal at 2 g/L dose). Removal is susceptible to processing of the polymer and batch to batch variation has been observed. Field emission scanning Electron microscope (FESEM) showed polymer consists of micron-sized (1-2 micron diameter) clusters. Phosphate and nitrate strongly inhibited total chromium uptake while effect of sulphate and chloride were less. Desorption was 86% with 1N HCl and reuse of the micron sized AFC was possible for four cycles. Ion exchange as well as redox interaction between chromate ion and protonated amine group of polymer was found to be the key factor for adsorption.

* Corresponding author: saswati@iitg.ernet.in (S. Chakraborty); Phone: +91-361-2582412; Fax: +91-361-2690762.

* Corresponding author: manabray@iitg.ernet.in (M. Ray); Phone: +91-361-2582310; Fax: +91-361-2690762.