

Comparative study of EVA-Cloisite® 20A and heat-treated EVA-Cloisite® 20A on heavy-metal adsorption properties

Derrick S Dlamini, Ajay K Mishra* and Bhekile B Mamba

Department of Applied Chemistry, University of Johannesburg, PO Box 17011, Doornfontein 2028, Johannesburg, South Africa

Abstract

Ethylene vinyl acetate (EVA)/ Cloisite® 20A (C20A) composite fabricated via the melt-blending method was used for the development of a heavy-metal adsorbent through acid and heat treatment. Heat-treated composites were produced at 400°C to 1 000°C in air and N₂ atmospheres. The materials were characterised through TGA, FT-IR, contact angle and Zetasizer. Treating EVA/C20A composites with H₂SO₄ at 130°C reduced the contact angle from 99.73° to 30.40°. The acid-functionalised composite was tested for the removal of Pb²⁺ and an adsorption capacity of 49 mg·g⁻¹ was recorded while the heat-treated composite exhibited an adsorption capacity of 153 mg·g⁻¹.

Keywords: ash, EVA, bentonite, activation, adsorption