



Removal of xanthate from aqueous solutions by adsorption onto untreated and acid/base treated activated carbons

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ABSTRACT

Xanthate is a widely common pollutant in wastewaters of mineral industries. The removal of ethyl xanthate (EX⁻), the most widely used xanthates in mineral industries, from aqueous solutions was studied by activated carbon adsorption as the clean and cost-effective industrial wastewater treatment technology. The characterization of activated carbon (AC) was performed by a point of zero charge determination, scanning electron microscopy, wavelength dispersive X-ray, surface area, and a pore size analyzer. The evaluation of initial solution concentration, pH, temperature, particle size, and surface chemistry of AC on the adsorption process showed that it is a high-potential adsorbent for xanthate removal. The study of EX⁻ adsorption onto acid/base treated ACs revealed that the adsorption of EX⁻ primarily occurs on non-polar carbon surface patches where it is driven by hydrophobic interactions. The equilibrium and kinetic data were best modeled by the Koble–Corrigan isotherm and fractional power kinetic model, respectively. The rate-limiting step during the EX⁻ adsorption onto AC was determined to be pore diffusion. The thermodynamic studies revealed that the adsorption process is spontaneous and endothermic.

Keywords: Adsorption removal; Ethyl xanthate; Activated carbon; Adsorption mechanism

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