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ABSTRACT

This work presents studies of static, kinetic and dynamic of the As(III) adsorption from aqueous solutions onto fly ash from power plant in Zgierz and fly ash agglomerates.

The work consists of three main parts: literature review, methodology and characteristic of mineral materials, and results. The first one presents literature review concerning possibility of using fly ash as adsorbent for As(III) to remove them from aqueous solutions. The literature studies include a discussion about adsorption process and granulation process and also description of fly ashes. The second one presents methodology of measurements and characteristic of fly ash from Zgierz and fly ash agglomerates. The third one presents description of results. The granulation process and the effects of pH, adsorbent dosage, temperature and contact time on the adsorption As(III) were described.

The measurements were carried out at natural pH of fly ash (11,5) or fly ash agglomerates (10,5) and at 25 ^{o}C, 35 ^{o}C, 45 ^{o}C and 55 ^{o}C. The adsorption equilibrium was determined for both adsorbents using Henry, Freundlich, Langmiur, Temkin, Dubinin-Raduszkiewicz and Redlich-Peterson equations. Best evidences are for Langmuir model ($R^2 > 0,998$). Kinetic studies indicated that the sorption of As(III) follows from pseudo second order (PSO) chemisorptions model ($R^2 > 0,999$). Thermodynamic parameters indicate to endothermic ($\Delta H^0 > 0$) and spontaneous ($\Delta G^0 < 0$) nature of adsorption As(III). It was shown that the mass transfer process is controlled by the pore diffusion.

The results suggest that the fly ash and fly ash agglomerates can be suitably used for As(III) removal from aqueous solutions.