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BOOK OF ABSTRACTS

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STUDY OF THE EFFECTS OF ACTIVE BROMINE SPECIES PRESENCE IN ELECTROLYTIC DESULFURIZATION OF SUBBITUMINOUS COAL

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Abstract

The removal of organic and inorganic sulfur from the Bogovina Basin subbituminous coal by electrochemical redox reactions was performed. The effect of presence of active bromine species on the desulfurization process was monitored. The desulfurization was performed in inorganic acidic solutions that contained different bromide concentrations and in pure acid solution. To determine the optimal conditions for the desulfurization process, polarization curves were recorded in three different electrolytes: 0.1 M H_2SO_4, 0.1 M H_2SO_4 + 0.01 M KBr, and 0.1 M H_2SO_4 + 0.1 M KBr using graphite and dimensionally stable anode (DSA) electrodes as the anode, while in all cases stainless steel S31603 electrode was used as cathode. By analyzing the results obtained from the polarization curves, 0.1 M H_2SO_4 and 0.1 M H_2SO_4 + 0.1 M KBr were chosen as the most suitable electrolytes. Also, it was found that the DSA anode showed better results in terms of energy efficiency of the process compared to the graphite anode and therefore it was selected for the coal desulfurization process. It is considered that finely suspended coal particles in an electrolyte can behave according to bipolar electrochemistry. Coal was treated for 4 hours in two selected electrolytes. The suspension was sampled at different times up to 240 min from the beginning of the process. Sulfur content in coal was determined by elemental analysis. The results showed that the sulfur content decreases faster in the case of the electrolyte containing KBr, i.e. that the desulfurization effect is significantly better than in the case of the system containing only H_2SO_4. It can be concluded that active bromine species accelerate the desulfurization process and thus improve energy efficiency.

Key words: *subbitominous coal; oxidative desulfurization; organic sulfur; active bromine species; electrolytic desulfurization; DSA*