

Characterization of Activated Tire Char (ATC) and Adsorptive Desulfurization of Tire Pyrolytic Oil (TPO) Using ATC

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Abstract : The adsorptive ability of different carbon materials, tire char (TC), demineralized tire char (DTC), activated tire char (ATC) and Aldrich supplied commercial activated carbon (CAC) was studied for desulfurization of tire pyrolytic oil (TPO). TPO with an initial sulfur content of 7767.7 ppmw was used in this present study. Preparation of ATC was achieved by chemical treatment of raw TC using a potassium hydroxide (KOH) solution and subsequent activation at 800°C in the presence of nitrogen. The thermal behavior of TC, surface microstructure, and the surface functional groups of the carbon materials was investigated using TGA, SEM, and FTIR, respectively. Adsorptive desulfurization of TPO using the carbon materials was performed and they performed in the order of CAC>ATC>DTC>TC. Adsorption kinetics were studied, and pseudo-first order kinetic model displayed a better fit compared to pseudo-second order model. For isotherm studies, the Freundlich isotherm model fitted to the equilibrium data better than the Langmuir isotherm model.

Keywords : ATC, desulfurization, pyrolysis, tire, TPO

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