

Removal of Gas-Phase Sulfur Compounds by Transition Metals-Impregnated Activated Carbons

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In this study, several samples of transition metal-impregnated activated carbon were used to capture dimethyl sulfide (DMS) in fuel gas. These screening tests indicate that Cu-AC showed a good performance for the removal of DMS. Additionally, the adsorption and desorption of each single component of DMS, tert-butylmercaptan (TBM) and tetrahydrothiophene (THT) were then compared on Cu-AC. The results show that the sulfur adsorption capacities depend significantly on the impregnated loading of copper metal, and that their relationship is that of a parabolic dependence. The maximum sulfur adsorption capacities for each single component of DMS, TBM and THT are 1.16, 1.16 and 2.29 mmol S/g, respectively; these correspond to particular loading values of copper metal, which are 1.0, 1.0 and 0.25 mmol per gram of activated carbon. These adsorption capacities are remarkable values in comparison with those of virgin activated carbon, which obtains sulfur uptakes of 0.47, 0.46 and 1.56 mmol S/g for DMS, TBM, and THT, respectively. The TPD profiles indicated that while the copper (II) chloride impregnation created new adsorption sites for TBM, this did not occur in the cases of DMS and THT.