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MODIFICATION OF ACTIVATED CARBON BY THE GAS-PHASE CHLORINATION WITH CH_2Cl_2 VAPOR

It was shown that the gas-phase chlorination of Activated Carbon (AC) with dichloromethane is an effective method of modifying and provides grafting of chlorine up to 4.5 mmol/g for HSHD and 8.7 mmol/g for SCN. According to the chemical analysis of the chlorinated AC samples, the concentration of the grafted chlorine increases with the temperature increase. The higher concentration of the grafted chlorine in the case of the SCN in comparison with the HSHD, is explained by its greater matrix reactivity. The results obtained of the surface chlorination demonstrate perspective of using this method for modifying AC in order to obtain carriers and sorbents with a high concentration of grafted groups. The gas-phase chlorination of the AC samples (a batch of 50 mg), previously dried at 120 °C for 2 hours, was conducted with CH_2Cl_2 vapor in a stream of argon (40 cm^3/min) under non-isothermal and isothermal conditions using gravimetric control of the reaction. A characteristic feature of the SCN chlorination was an intensive growth of the mass without achieving saturation at high temperatures, which is explained by contribution of attaching carbon to the coal matrix on the background of the grafting chlorine. A similar character of the chlorination curve (without achieving saturation) was observed in the case of the SCN sample, but only at temperatures above 700 °C. The Surface condition of the chlorinated AC samples was studied using temperature programmed desorption mass spectrometry (TPD MS) analysis of particles that were desorbed. The TPD MS studies showed that regardless of the AC brand the grafted chlorine is quite reactive and is desorbed only as HCl molecules at moderate temperatures. Also the kinetic parameters for the SCN chlorination in the temperature range 500-600°C were calculated.

Key words: activated carbon gas-phase chlorination, surface modification, TGA, TPD MS.