

STRUCTURAL PARAMETERS OF ACTIVATED CARBONS ENRICHED WITH HETEROATOMS

Marina Tcaci, Petuhov Oleg, Raisa Nastas, Tudor Lupascu

*Institute of Chemistry of Academy of Sciences of Moldova, 3, Academiei str., Chisinau,
MD-2028, Republic of Moldova (E-mail: marina.tcaci@yahoo.com)*

Active carbons gained significant interest as catalysts and catalyst supports on oxidation of hydrogen sulphide, and sulphur dioxide, decomposition of hydrogen peroxide and oxidation of some organic compounds due to their high surface area, high chemical stability and favourable price. The catalytic performance of carbons can be significantly improved by introducing foreign atoms, such as nitrogen and oxygen.

Activated carbons of nuts shells origin (CAi) were used in this study. Before modification with urea, samples of carbons were oxidized with 36% H₂O₂. To introduce nitrogen groups, the oxidized carbons (CAO) were treated with urea. The samples impregnated with urea were heated in nitrogen at 500°C (CAON5) and 800°C (CAON8).

The elemental analysis shows a significant increase in nitrogen content for oxidized samples after modification with urea. As expected, the nitrogen content is lower for samples treated at a higher temperature. The nitrogen species formed at a lower temperature such as amines, amides, nitriles are not stable at higher temperatures or are transformed into more stable species such quaternary and pyridine types. After treatment at 800°C quaternary and pyridine type nitrogen are expected to be present in the carbons.

Parameters of porous structure, calculated from nitrogen adsorption isotherms.

<i>Sample</i>	S_{BET} , m^2/g	C_{BET}	V_s , cm^3/g	V_{me} , cm^3/g	V_{mi} , cm^3/g	R_{mi} , nm	E_a , kJ/mol
CAi	1065	1027	0.709	0.434	0.27	0.618	19.26
CAO	811	2797	0.334	0.025	0.31	0.580	20.55
CAON5	847	1410	0.465	0.020	0.27	0.592	16.04
CAON8	726	2217	0.325	0.063	0.26	0.616	20.59

The applied treatments changed the porosity of the samples. Oxidation resulted in a 25% decrease of the surface area as a result of pore walls and micropores blockage by functional groups. These modified activated carbons are supposed to be used for treatment of sulphurous water.