

# Study of the surface chemistry of activated carbon obtained by chemical activation

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The use of activated carbon sorbents in the water treatment technologies is one of the most safe and effective methods of water treatment. Carbon materials, obtained by chemical activation, have an important role in the immobilization of heavy metal ions from aqueous solutions due to the fact, that different acidic functional groups (carboxyl, phenolic, hydroxyl *etc.*) are producing on the surface of adsorbents during the activation process [1, 2].

The purpose of this research was to study the surface chemistry of activated carbon produced from plum stones (CAPr) and nut shells (CAN-7) using the phosphoric acid as an activating agent. The quality indices (adsorption of methylene blue and I<sub>2</sub>, humidity), the porous structure parameters (calculated from nitrogen adsorption-desorption isotherms), the amount of total acidic groups of the studied activated carbons were determined. Some of the obtained results are given in the table.

Quality indices and porous structure parameters of activated carbons

| Sample | $S_{sp}$ ,<br>m <sup>2</sup> /g | $V_s$ ,<br>cm <sup>3</sup> /g | $V_{mi}$ ,<br>cm <sup>3</sup> /g | $V_{me}$ ,<br>cm <sup>3</sup> /g | adsorption I <sub>2</sub> ,<br>mg I <sub>2</sub> /mg AC | Humidity,% |
|--------|---------------------------------|-------------------------------|----------------------------------|----------------------------------|---|------------|
| CAN-7  | 725                             | 0.64                          | 0.24                             | 0.16                             | 806.8   | 9.74       |
| CAPr   | 801                             | 0.54                          | 0.25                             | 0.28                             | 895.1   | 3.75       |

In order to identify the functional groups on the surface of investigated samples was used the Boehm method of titration with aqueous solutions of NaHCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>, NaOH and HCl. Analysis of the obtained results allows us to notice the presence of a substantial amount of acidic functional groups for the studied samples of activated carbons. Taking into account the fact that the degree of sorption of heavy metal ions depends on the quantity and quality of the acidic groups on the surface of adsorbent we can assume that the activated carbons CAPr and CAN-7 will exhibit a high level of immobilization of heavy metal ions and they can be used in the water treatment processes.

1. T. Lupașcu. Activated carbon from vegetal raw materials. Monograph/ In Romanian L.: ÎEP: Știința, Chișinău, 2004.
2. T. Lupașcu, Tehnologii moderne de obtinere a carbunilor activi si utilizarea lor pentru protectia mediului si a sanatatii omului. Buletinul ASM, Seria ȘBCA, N 1 (2004) 170.