Nanocomposites and nanomaterials

Structural, thermal and energetic characteristics of synthetic active carbons prepared on the basis of ion-exchange resin Amberlite IRC 84

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The use of waste ion-exchange resins as active carbon precursors has many economic and ecological advantages. This particularly applies to spent ion-exchangers containing different metal ions (Na, Ca, Fe, etc.) which can affect pyrolysis yield and mechanical properties of the resulting carbon material. So, it seems to be very interesting to carry out an extensive researches to determine structural, thermal and energetic properties of such materials.

The aim of this paper was to investigate the effect of the content of Ca^{2+} ions and condition of the activation process on the structural and thermal properties of synthetic active carbons as well as the structure of adsorbed water layers on their surface. The synthetic carbons were prepared in the inert atmosphere (He or He/H_2 mixture) on the basis of ion-exchange resin Amberlite IRC 84 impregnated from the solutions of different calcium concentrations (C_{Ca} = 0.04; 0.1 and 1M). They were characterized using nitrogen adsorption/desorption and thermal methods (TG/DTA). Thermogravimetry under quasi-isothermal conditions (Q-TG/DTG) was applied to determine the structure of water layers adsorbed on the surface of studied adsorbents. As a result the series of adsorbents of slightly differentiated structural characteristics was obtained. It was shown a diversity of thermal and energetical properties of tested carbons.

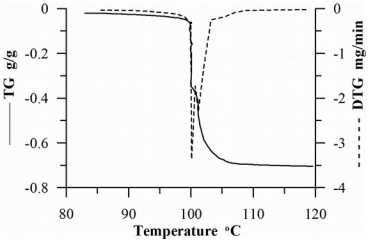

Figure 1. Q-TG and Q-DTG curves of water thermodesorption from the surface of exemplary active carbon.