

Thermal treatments of activated carbon fibres using a microwave furnace

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Abstract

Thermal treatment of activated carbon fibres (ACF) in a flow of N₂ gas has been carried out using a microwave device operating at 2450 MHz and with a power input of 1000 W, instead of a conventional furnace, and the samples were analysed by means of low temperature N₂ adsorption, elemental analysis and determination of points of zero charge. The results show that microwave treatment for periods between 5 and 30 min affects the porosity of the ACF, causing a reduction in micropore volume and micropore size. More importantly, the results also show that microwave treatment is a very effective method for modifying the surface chemistry of the ACF. During microwave treatment surface groups are completely eliminated, whereas oxygen and nitrogen atoms bonded within the pseudo-graphitic layer planes are retained. On re-exposure to air the surface groups only reform to a very limited extent and as a result very basic carbons, with points of zero charge approximately equal to 11, are readily obtained. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Activated carbon fibres; Microwave treatment; Surface oxygen complexes; Basic carbons
