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Numerical Evaluation of the Effect of the used Activator on the Formation of the Microporous Structure of the Activated Carbons

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Microporous carbonaceous materials and the adsorption processes taking place on their surface have been the object of widespread research and application. In particular these materials are used to rid the air of substances that are harmful to human health, including for protection from poisonous substances and for environmental protection in the processes of removing harmful substances from waste gases. The porous structure and functional properties of carbonaceous adsorbents are dependent on the structure of the original raw material. As a consequence, the choice of suitable material is no less important than the selection of adequate production method and the determination of optimum process conditions. Therefore, a search for new raw materials that would be useful in the production of carbonaceous adsorbents has been under way and particular attention has been paid in this regard to biomass waste from food and timber industries and agriculture. The work presents numerical evaluation of the effect of the used activator and the raw material on the formation of the microporous structure of the activated carbons. The numerical calculations were carried out based on of the adsorption isotherms of nitrogen taken from literature. On the basis of the research and analyses, a significant effect of the type of the activating agent used as well as the raw material on the formation of the porous structure and, consequently, on the adsorptive properties of the produced activated carbons were observed. The new proposed method provides a wider spectrum of information on the analyzed porous structure of the activated carbons and the processes occurring on their surface, what provides a unique tool enabling a precise characterization of the structure of the carbonaceous microporous materials and this in turn makes it possible to optimize the processes of their manufacture.

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Biography

Dr. Mirosław Kwiatkowski in 2004 obtained Ph.D. degree from the Faculty of Energy and Fuels at the AGH University of Science and Technology in Kraków (Poland) and in 2018 D.Sc. degree from the Faculty of Chemistry at the Wrocław University of Technology (Poland) in the discipline: chemical technology. In addition, he obtained a certificate of completion of postgraduate studies: Professional Research and Development Project Manager at the Krakow University of Agriculture (Poland), Research and Development Project Manager at the University of Economics and Innovation in Lublin (Poland) and Electrical Energy Markets from the Faculty of Electrical Engineering, Automatics, Computer Science and Biomedical Engineering at the AGH University of Science and Technology in Krakow (Poland). His published work includes more than 45 papers in reputable international journals and 90 conference proceedings. He is the editor in chief of The International Journal of System Modeling and Simulation (United Arab Emirates), an associate editor of Micro & Nano Letters Journal (United Kingdom) and a member of the editorial board of international journals as well as a member of the organizing and scientific committees international conferences in Europe, Asia and United States of America.