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Study of ash removal from activated carbon and its result on CO2 sorption capacity

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It is being observed that average temperature on Earth increases each year. This phenomenon can be explained by a theory known as a greenhouse effect. Thermal radiation, which is being emitted from the Earth's surface, is being absorbed by molecules in the atmosphere. Mainly, these molecules are methane, carbon dioxide and water vapor. The greater their concentration in the atmosphere, the more thermal radiation is being absorbed. To mitigate further intensification of the greenhouse effect by reducing CO_2 emission, some technologies are being developed. They are known as a Carbon Capture and Storage (CCS). One of those technologies is post-combustion capture of CO_2 on solid sorbents, like activated carbon (AC). AC is a porous material with well developed specific surface area. It is obtained through carbonization of a precursor with predominating carbon element and next activation- physical, chemical or combined. Depending on precursor's source, the amount of impurities, also known as ash, in final AC may vary from less than 1 wt% to even 15 wt%. Nevertheless, the content of these impurities might be lowered in sorbent by acid treatment. AC BA11 delivered by Carbon, Poland contains 11 wt% of inorganic impurities. Acid treatment (HCl, HNO3 and HF) was performed to remove ash and its result on CO_2 sorption capacity was measured for each sample. Samples were characterized in terms of texture (BET) and chemical composition (XRF, XRD and XPS). The highest enhancement of 44% CO_2 sorption capacity was achieved for activated carbon after hydrofluoric acid treatment.

Biography

Michał Zgrzebnicki has graduated from West Pomeranian University of Technology in Szczecin, Poland in 2016. He has been working in Polish-Norwegian research project called "Post-Combustion CO2 Capture on New Solid Sorbents and Application in a Moving Bed Reactor" since February 2015.

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