

The Role of Water on the CO₂ Absorption of the Potassium-Based Activated Carbon Sorbent

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Potassium-based sorbents were prepared by impregnation with potassium carbonate on activated carbon (KACI30). The role of water in the pretreatment and in CO₂ the absorption process was investigated in a fixed bed reactor (CO₂ capture at 60°C and regeneration at 130–150°C). In particular, to identify the role of water in the CO₂ absorption process, the amounts of water desorbed during the CO₂ absorption processes after the pre-treatment with 9 vol.% H₂O was measured and compared as a function of relative operating humidity. It was found that the presence of water in the pre-treatment is an important factor to obtain the enhanced net CO₂ capture capacity of the sorbent, and that the H₂O concentration in the CO₂ absorption process plays an important role on the total CO₂ capture capacity. This result is explained by the changes in the relative humidity of the reactor during the CO₂ absorption process, which is originated from the water desorbed from the fully activated sorbent during the pretreatment.