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Post combustion capture of carbon-dioxide by adsorption with groundnut husk-based activated carbon

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The prospect of a worsening climatic situation due to global warming is a subject of widespread public concern, with annual global emissions of carbon dioxide (CO₂) having escalated by about 80% between 1970 and 2011 according to the United Nations report. CO₂ emissions are mainly generated from the combustion of fossil fuels (coal, oil, and natural gas), the main energy resources of our daily life, economic growth and industrial development. Before we realize the cleaner alternative energy being advocated for today, CO₂ emissions will continue to increase, it is thus important and mandatory for us to capture and separate CO₂ in order to minimize their environmental impact. The present study investigates the use of groundnut husk-based activated as an adsorbent for carbon dioxide (CO₂) capture. CO₂ was captured from a post combustion flue gas using the activated carbon packed in an adsorption column by the process of physical adsorption. Effects of certain parameters such as time, adsorbent dosage, sorption time, temperature and pressure, on the adsorption process were studied. Results show that the percentage of CO₂ adsorbed increased as time, sorbent dosage and pressure increases, while there was a decrease in % CO₂ adsorbed as the temperature increased. Optimum reaction conditions were gotten at time interval 30 minutes, sorbent dosage of 20g, pressure of 0.5bar and temperature of 300C, resulting in % CO₂ adsorbed of 52.05%, 97.00%, 73.52% and 63.59% respectively. Activated carbon produced from groundnut husk has therefore proven to be an environmentally friendly material with the potential for carbon dioxide capture in order to mitigate environmental pollution caused by the release of carbon dioxide into the atmosphere. More agricultural wastes should be converted into activated carbon for CO₂ captures so as to reduce overall cost.

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