**Abstract**

This study reports the potential of acid and base modified sugarcane bagasse activated carbon for carbon dioxide (CO2) adsorption. The rate of CO2 adsorption by the unmodified (UMAC), acid (AMAC) and base modified activated carbon (BMAC) was determined gravimetrically via weight differential measurement. Surface morphology and functional group of the adsorbent before and after adsorption were also determined. The adsorbents performance was evaluated using a cylindrical glass column equipped with a digital weighing balance. Characterization of adsorbents showed that BMAC had a better pore structure thereby making it the most effective adsorbent for CO2. CO2 adsorption increased over time in the order UMAC < AMAC < BMAC. The highest amount (148.5 mg.g−1) of CO2 was adsorbed at 25°C and 25 min. The adsorption kinetics followed second-order kinetics with a regression coefficient (R2) of 0.9967. The activation energy (Ea) of the process was evaluated to be 5.77, 13.02 and 13.55 kJ.mol−1 for BMAC, AMAC and UMAC respectively. The low Ea observed suggests that CO2 is weakly bonded to the adsorbent surface. The acid and base modified sugarcane bagasse activated carbon produced is characterized with enhanced capacity for CO2 adsorption.