

## **Carbon dioxide adsorption on activated carbon hydrothermally treated and impregnated with metal oxides**

### **ABSTRACT**

Activated carbon (AC) has been used widely as an agent for carbon dioxide (CO<sub>2</sub>) adsorption due to its environmentally friendly nature, low cost, high porous structure, high surface area and good mechanical properties. Modifications have been made to AC in order to enhance its adsorptive properties. In this study, the performance of activated carbon modified by hydrothermal treatment and impregnation techniques was compared using metal oxides. The prepared samples were characterized by different techniques using X-ray diffraction (XRD) and scanning electron microscopy (SEM). The adsorption of CO<sub>2</sub> was investigated using a CO<sub>2</sub> adsorption unit, whereby 20% of CO<sub>2</sub> gas was passed through the samples until a breakthrough point was achieved. During the adsorption study, it was found that AC that had been hydrothermally treated with cerium oxide (CeO<sub>2</sub>) had the highest adsorption capacity of 0.856 mmol/g with a breakthrough time of 19.33 min.

**Keyword:** Activated carbon; Carbon dioxide; Hydrothermal; Impregnation; Metal oxides