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ABSTRACTS

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Uptake capacity of adsorbent materials derived from municipal solid waste for CO₂ capture at post-combustion condition

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1. Introduction – The global climate change, as well as the accumulations of solid waste on landfills, are two of the primary issues nowadays, which it needs the significant attempts to reduce the impact on the ecosystem and environment from both of them [1]. In this work, the production of materials from organic solid waste is considered to produce adsorbent materials, which are assessed in the CO₂ capture.

2. Experimental – The compost used was obtained in mechanical biological treatment plants for municipal solid waste, supplied by the company “Resíduos do Nordeste, EIM”. In order to homogenise and remove the soluble compounds and suspended solids, the compost was first mixed with water and washed. Then, two different materials were prepared by carbonization at 400 (C-400) and 800 °C (C-800). In addition, following the procedure previously described [2], two materials were prepared with H₂SO₄ before and after the carbonization at 800 °C (C-S-800 and C-800-S, respectively). Then, breakthrough measurements of CO₂ carried by He at different partial pressures and post-combustion conditions (40-100 °C) were conducted.

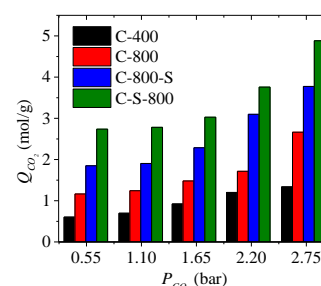


Figure 1. Uptake capacities of prepared materials for CO₂ adsorption at 40 °C.

3. Results and Discussion – Figure 1 shows the adsorbed volume of CO₂ (Q_{CO_2}) with the four samples at 40 °C. As can be observed, the increment in the temperature calcination and the activation with H₂SO₄, lead to a higher adsorption capacity. The sample C-S-800 shows the higher uptake capacity, which is comparable with commercial adsorbents [3]. The result may be ascribed to its textural properties.

4. Conclusions – The CO₂ capture by using adsorbents prepared from organic solid waste was proved to be a solution for two current problems.

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