

RICE.R. CO₂: Raw Materials from Rice Husk to Capture CO₂

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Carbon dioxide is the most important greenhouse gas emitted by human activities and its quantity is constantly growing. 20% of rice production results to be waste and its ashes are rich in silica. This project looks for new strategies to capture carbon dioxide, using rice husk, a local waste raw material. Rice waste was first treated with three different acids (HCl, H₂SO₄ and HNO₃) in order to purify it. The combustion of rice waste was carried out at 500, 600 and 700°C for 3h and 6h, in the presence of air or in a modified atmosphere. The silica contained in the ashes was functionalized with monoethylamine, diethylamine or polyethylenimine branched (PEI) at 5, 10, 15, 20 and 25% w/w. Known quantities of CO₂ were sent onto the samples, and we studied the processes of physisorption and chemisorption by FTIR spectrophotometry. CO₂ absorption occurs in the region between 2400 and 2200 cm⁻¹, while the processes of CO₂ chemisorption give a signal in the region between 1800 and 1400 cm⁻¹. The operating parameters that provided the best CO₂ absorption were: pre-treatment of rice husk with HCl, combustion at 700°C for 6 hours and functionalization with polyethylenimine branched. The transformation of rice husk ashes, a local waste by product, into CO₂ absorbing materials is feasible. Among the tested conditions, the best results were obtained with samples treated with polyethylenimine branched.