

Preparation of Tablet Activated Carbon from Carbon Waste with Starch as Binder

Chada Siriphattananon¹, Siriporn Romjinda¹, and Kriangsak Kraiwattanawong^{1*}

¹Department of Chemical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok, Thailand, 10520

*E-mail: kkkkrai@hotmail.com

Abstract

A powdered carbon waste derived from a combustion chamber in a pulp mill is eliminated by landfill. The purpose of this work is to add a value to the carbon waste by preparing a tablet activated carbon (TAC). TACs were prepared from the carbon waste with starch as a binder. The carbon waste and starch were blended and molded to form tablet composites. The mass ratio of a binder to a carbon waste (B/C) was ranged from 0.05 to 0.25 g/g. The tablet composite was carbonized at 700 °C for 90 min to become a tablet carbon (TC) and subsequently activated by CO₂ at 700-900 °C for 30 min to be TAC finally. TC and TAC were characterized by nitrogen adsorption, scanning electron microscopy (SEM) and compression testing. The results show that the apparent density is decreased by the increase of B/C ratio. At B/C = 0.10 g/g, the modulus of TC is maximized at 0.25 MPa and its TAC is decreased to 0.22 MPa since the mass loss. The SEM images of TC and TAC reveal that the carbon structure from starch is spherical particles deposited on the surface of carbon wastes. The more starch addition, the smaller surface area and the smaller mesopore volume of TCs and TACs are obtained. It is possible that starch may act as film closing the pore and its carbon structure's starch has the low porous properties; therefore, the porous properties of TCs and TACs are decreased with the increase of B/C ratio.

Keywords : Activated carbon: Pulp waste: Starch: Porous properties

Primary author: Dr KRAIWATTANAWONG, kriangsak

Presenter: Dr KRAIWATTANAWONG, kriangsak

Track Classification: Material Physics, Nanoscale Physics and Nanotechnology