

BULK DENSITY, MICROCRYSTALLITE AND POROSITY OF CARBON PELLET FROM NITRIC ACID TREATED SELF-ADHESIVE CARBON GRAIN FROM OIL PALM EMPTY FRUIT BUNCH

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ABSTRACT

Self-adhesive carbon grain (SACG) prepared from oil palm empty fruit bunch (EFB) by a low carbonization process were treated with 1, 3, 5 and 7 Molar (M) nitric acid (HNO_3) at 27°C and 100°C . The SACG green pellets were converted into carbon pellets by a carbonization process up to 1000°C in N_2 environment using a multi-step heating profile. The treatment was found to increase the green pellets density from 1.24 gcm^{-3} to about 1.35 gcm^{-3} , but there was no significant change in pellet density after carbonization. X-ray diffraction analysis showed that 1 M treatment at 27°C caused the stacking height (L_c) and width (L_a) of microcrystallites of carbon pellets to increase from 0.866 to 1.339 nm and from 3.534 to 8.720 nm respectively. Above 1 M the microcrystallite dimension of carbon pellets decreased but their values are still higher than that for the untreated samples. A similar trend was observed for the treatment at 100°C . The BET isotherm plots show that the increase in molarity can widen the middle region of the relative pressure that has negative curves, and for molarity higher than 3 M the BET experiment is no longer able to produce such a plot. This results demonstrate that a significant change in the microcrystallite dimension or pore structure in carbon pellets due to the treatment is corresponding to a dramatic change in their adsorption capacity.

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