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Pyrolysis Study of Sarawak Coal Using Thermogravimetric Analysis

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Abstract

Pyrolysis of Sarawak coal was conducted using thermogravimetric (TG) study. Two coal samples, sub-bituminous (Merit Pila coal) and bituminous (Silantek coal) were investigated within the temperature range of 300-900 °C at different heating rates of 10, 20, 30 and 40 °C min⁻¹, under inert nitrogen gas atmosphere. Differential thermogravimetric (DTG) data were analyzed using an Arrhenius type reaction model assuming a first-order reaction. Kinetic parameters, such as reactivity value, R_T and activation energy, E_a for the coals, were determined at different heating rates. Maximum rate temperatures and reactivity values for the coals were increased as the heating rates increased. The temperature at which maximum rate of decomposition occurred was found to be higher for bituminous coal than for lower rank coal. The activation energy E_a for the coal is 37.40-38.92 kJ mol⁻¹, with sub-bituminous coal showing slightly higher E_a than bituminous coal.

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