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Kinetics Analysis on Catalytic Pyrolysis of Empty Fruit Bunch (EFB) with Copper Oxide Doped Aluminium Oxide (CuO/Al_2O_3) Catalyst

Abstract

This study focuses on dynamic non-catalytic and catalytic pyrolysis of empty fruit bunch (EFB) with copper oxide doped aluminium oxide (CuO/Al2O3) at linear ramp rates of 10, 15, 20, 25, 30 and 40 Cmin-1 at pyrolysis temperature of 28-1000 C in a thermogravimetric analyzer (TGA). The thermogravimetric profiles for the thermochemical breakdown of EFB under non-catalytic and catalytic pyrolysis with CuO/Al2O3 comprise of three different levels. The kinetics analysis for the reactions were evaluated using the Kissinger and Ozawa methods. The values of activation energy (Ea) for non-catalytic EFB pyrolysis were 167.95 and 177.68 kJmol-1 based on Kissinger and Ozawa methods respectively. For catalytic pyrolysis with approximately 9.09 wt% CuO/Al2O3 catalyst, the values of Ea reduced to 127.72 and 137.42 kJmol-1 by Kissinger and Ozawa methods respectively. These values indicate that the presence of 9.09 wt% CuO/Al2O3 catalyst has successfully reduced Ea value for the EFB pyrolysis reaction.