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Thermogravimetric kinetic analysis of in-situ catalytic pyrolysis of palm oil wastes with the presence of palm oil wastes ash catalyst

S W Hii[1], B L F Chin[1], C L Yiin[2], F R S Majing[1], Z A Jawad[3], H Y Lim[4], S Yusup[4], M N Acda[5], P Unrean[6] and E Rianawati[7]

[1] Department of Chemical Engineering, Faculty of Engineering and Science, Curtin University Malaysia, CDT 250, 98009, Miri Sarawak
[2] Department of Chemical Engineering and Energy Sustainability, Faculty of Engineering, Universiti Malaysia Sarawak (UNIMAS), Kota Samarahan 94300, Sarawak, Malaysia
[3] Department of Chemical Engineering, College of Engineering, Qatar University, P.O. Box: 2713, Doha, Qatar
[4] National HiCoE Thermochemical Conversion of Biomass, Centre for Biofuel and Biochemical Research, Institute of Sustainable Building, Chemical Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar, Perak 32610, Malaysia
[5] College of Forest Products and Paper Science, University of the Philippines Los Baños, Laguna 4031, Philippines
[6] National Center for Genetic Engineering and Biotechnology (BIOTEC), 113 Thailand Science Park Paholyothin Road, Klong 1, Klong Luang, Pathumthani 12120, Thailand
[7] Resilience Development Initiative, Jl. Imperial Imperial 2, No. 52, Bandung 40135, Indonesia

Email: bridgidchin@curtin.edu.my

Abstract. The thermal degradation and kinetic analysis for oil palm frond (OPF) and oil palm trunk (OPT) with its ashes were investigated using thermogravimetric approach (TGA). OPF ash, OPT ash and its mixtures are used as a natural source of catalysts in the pyrolytic conversion of the palm oil wastes to bioenergy. The TGA experiments were conducted in a range of heating rates of 10-100 K/min from the temperature of 323 K to 1173 K. Coats-Redfern model is applied in this study to evaluate the activation energy (E_A) and pre-exponential factor (A). The average E_A values ranged 24.27-32.36 kJ.mol^{-1} and 41.42-46.10 kJ.mol^{-1} for pyrolysis of OPF and OPT respectively. Meanwhile, the average E_A values ranged 24.27-31.06 kJ.mol^{-1} and 31.77-43.45 kJ.mol^{-1} for catalytic pyrolysis of OPF and OPT respectively.

1. Introduction

Renewable energy is an alternative energy to reduce environmental impacts produced on this earth. From the various types of renewable energy resources, biomass energy is chosen in this present study