

Potential Alternative Energy of Hybrid Coal from Co-pyrolysis of Lignite with Palm Empty Fruit Bunch and the Kinetic Study

Rinny Jelita, Iryanti Fatyasari Nata, Chairul Irawan, J. Jefriadi, Meda Nur Anisa, Muhammad Jauhar Mahdi, Meilana Dharma Putra

Department of Chemical Engineering, Lambung Mangkurat University, Indonesia

E-mail: mdputra@ulm.ac.id

Abstract- Lignite is classified as a low-rank coal due to its low content of calories. Co-pyrolysis with biomass waste such as palm empty fruit bunches (EFB) here can be used to increase lignite's economic value. The mixture of these two materials can produce an alternative energy source called hybrid coal (HC). This study aims to determine the optimum temperature for co-pyrolysis of lignite and EFB as well as characterize liquid (tar) and solid product (HC). Its kinetic study was evaluated as well. A raw material of 200 grams with a composition of 22.5% (w/w) EFB to lignite was put into a reactor to react at a temperature range of 300-450°C for 1 hour. To form hybrid coal briquettes (HCB), tapioca adhesive with a concentration of 6% (w/w) was added to the solid product (HC). The results showed that the tar yield increased with increasing temperature from 300 to 450°C. Similarly, the calorific value of HC increased by 14.50% as also occurred in other physical properties of HC. Meanwhile, the kinetic study revealed that the model was well-fitted to the data, and confirmed the obtained results. Thus, this research can support the development of affordable alternative energy to be implemented in large-scale production.

Keyword: Alternative energy, Co-pyrolysis, Empty fruit bunch, Hybrid coal, Lignite