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Extraction and Use of Potassium Hydroxide from Ripe Plantain Peels Ash for Biodiesel Production

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ABSTRACT

The extraction of the ash of ripe plantain peels to obtain potassium hydroxide (KOH) and its application in the trans-esterification of refined rapeseed and crude jatropha oils have been investigated. At 30 °C, extraction time 1 hr and volume of 5, 7.5 and 10 ml/g ash, the percentage recovery of KOH progressively increased in the first stage, from 26.05 to 26.20 and then to 30.75% respectively, but decreased in the second stage (extraction of the spent ash from stage 1), from 2.20 to 2.10 and to 1.90% respectively. Same trend was also observed at 40 and 50 °C but cumulatively, KOH values recovered increased relatively with increasing extraction time and temperature. The percentage cumulative recovery of KOH was 40.10% at extracting temperature of 50 °C, extracting volumes 10 ml/g ash and extraction time of 3 hrs while it was 40.00% at 50 °C, 10 ml/g ash and 2 hrs extraction time. The least percentage cumulative recovery of KOH was 28.25% at 30 °C with 5 ml extracting volume/g ash and 1 hr extraction time. The percentage purity of the extracted KOH gave 80.0%. The trans-esterification of the two vegetable oils showed the percentage conversion obtained with rapeseed oil was 71.01% using 1 g of KOH extract from ripe plantain peels ash at reaction temperature and time of 75 °C and 4 hours respectively. Under the same reaction conditions, 1 g of commercial caustic potash recorded

70.06% conversion of the rapeseed oil. From the optimized batch process, 97.15% conversion was achieved with crude jatropha oil using 1 g caustic potash extract from ripe plantain peels ash; at reaction temperature and time of 83 °C and 4 hours respectively.

Keywords: Biodiesel, Extraction, Potassium Hydroxide, Plantain Ash.

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