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OLEFINS AND FUELS FROM FRYING PALM OIL THROUGH PYROLYSIS

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Abstract

The pyrolysis of frying palm oil was studied in continuous stationary process, in a micropilot plant. The main factors affecting the products yields are temperature and residence time. For the studied parameters range (temperature: 475°C - 630°C and residence time: 120 s- 240 s), the gas yield varied between 7.9% (w/w) and 63.3% (w/w), related to feed. Unsaturated hydrocarbon yields (olefins) can reach 24-29% (w/w) related to feed, at the right processing parameters, the main products having good yields: up to 10% w/w for ethylene and 10.5% (w/w) for propylene. Also, the liquid fractions produced in the experiment were characterized having in view the use as fuel oils. The low viscosity (4.4-8.3 cSt at 20°C) and high heat of combustion value (9225-9260 kcal/kg) demonstrated that liquids are fit for use as fuel oil. These results are encouraging for industrial applications consideration. For this reason, mathematical modeling for the prediction of products yields was performed. The individual models for the main compounds (ethylene, propylene, methane, ethane, propane, carbon oxides) are in form of second degree polynomial equations; they are accurate as the statistical analysis proved.

Key words: biofuel, mathematical model; pyrolysis mechanism; renewable olefins; vegetable oil

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