CO-PYROLYSIS OF EMPTY FRUIT BUNCHES AND WASTE TYRE

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ABSTRACT

CO-PYROLYSIS OF EMPTY FRUITS BUNCHES AND WASTE TYRE

Thermochemical conversions include a number of possible processes to produce useful fuel and chemical. The based of thermochemical conversion is the co-pyrolysis process, which include all the chemical changes occurring when heat is applied to a material in the absence of oxygen. The main product of co-pyrolysis process is liquid oil, gas and chars. The purpose of study is to determine the weight loss of empty fruits bunches and waste tyre sample by using thermogravimetric analyzer. Then the liquid oil produce is analyzed to determine the major compound contain in the liquid oil. In this study the empty fruit bunches and waste tyre was cut and co-pyrolyzed using fixed bed reactor at 500°C with absence of oxygen. The whole solid (41.2 wt%), liquid oil (47 wt%) and gaseous (11.8 wt%) product generated during each co-pyrolysis were collected and characterized. 22.78 wt% of phenols contain in pyrolytic oil as a major compound. The characteristic of phenol is toxic and colorless crystalline solid with sweet odor. It can be used as adhesive resin, insulation material and others. From the thermogravimetric analysis shows that hemicellulose is the major component that decomposed in empty fruits bunches at 300°C. In waste tyre the major component of polyester will be decomposed at 500°C. The gross calorific value (GCV) of blend pyrolytic oil (39.310 MJ/kg), waste tyre liquid oil (39.100MJ/kg) and EFB liquid oil (16.4MJ/kg). Tyre pyrolysis residue have equal dimension as the original tyre portion and are easily disintegrable into black powder and steel cord. Carbon (black powder) of waste tyre increase from 27.82 wt% to 54.84 wt% after pyrolyzed because addition of inorganic filler to tyre rubber during the manufacturing process, which have potential to be use as semireinforcing and nonreinforcing carbon black.