Pyrolisis of plastic waste to produce pyrolytic oil as an alternative fuel

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Abstrak

The increasing amount of plastic waste often creates chronic problems to the environment. Many efforts have been made to reduce, as well as to reuse, the plastic waste. This study investigated the use of pyrolysis of plastic waste to produce fuel oil. Plastic carrier bags, considered a low-density polyethylene (LDPE), were used as feed material. A commercial natural zeolite was used as a catalyst to enhance the oil conversion. Approximately one kilogram of plastic waste was loaded into the reactor chamber and pyrolyzed. The reactor unit was equipped with an electrical heater, a temperature controller, a condenser, and a flare system. The pyrolysis process was conducted in the temperature range of 300?450°C. The experiments were ended after an hour, the time recorded from the emergence of the flare flame. The oil product was collected from the bottom of the condenser, and its volume was measured. The physical properties of oil, such as specific gravity, kinematic viscosity, gross heating value, flash point, and water content, were evaluated and compared to those of other commercial fuels. The experimental results demonstrated that the optimum temperature for pyrolysis of plastic waste was 350°C. At this temperature, the oil yield obtained was 52.6% (vol/w). In addition, the physical properties analysis results showed that the oil product’s properties were relatively closer to those of kerosene than to those of other commercial fuels.