SLOW PYROLYSIS OF PALM OIL SHELL AND LOW DENSITY POLYETHYLENE PLASTIC WITH NATURAL ZEOLITE CATALYST MIXTURE ABSTRACT

Continuous usage of fuel oil may cause fuel crisis in the future. Fuel oil originates from earth and can’t be renewed. Considering these facts, a study was performed on the pyrolysis of palm oil shells with plastic and natural zeolite catalyst mixture. The purpose of this study was helping to save fuel oil and determining the characteristics of the result of slow pyrolysis of palm oil shell and plastic waste with and without natural zeolite catalyst mixture.

Palm oil shells were cleaned from dust, then broken up by 1-2cm hammer before mixed with plastics which were cut into 3-7cm pieces. They’re pyrolyzed with 0%, 10%, 20%, and 30% mixture of palm oil shells and plastics. The materials were put into a pyrolysis reactor and added with natural zeolite catalyst, then they were heated and observed using temperature control tool until it reached 400°C, 450°C, and 500°C. Then, nitrogen was streamed in at 2L/minute to accelerate the release of hot steam.

The research result showed that by increasing the temperature by 50°C, the reduction of the resulting charcoal could reach 7%, and maximum oil was obtained at 400°C without any addition of catalyst. The addition of plastic could increase gas by 28% and increase the resulting charcoal by 32% because melted plastic hit palm oil shells, making it difficult for volatiles to be released. Moreover, by adding natural zeolite catalyst, the resulting gas could be significantly increased and the volume of oil was reduced because catalyst reduced the oxygen component in bio-oil. Other effects of adding catalyst was high levels phenol, alkane, and alkene chemical compounds.

Keywords - pyrolysis; palm oil; plastic; natural zeolite; GCMS