

## **Catalytic pyrolysis and a pyrolysis kinetic study of shredded printed circuit board for fuel recovery**

### **ABSTRACT**

Scrap printed circuit boards (PCBs) are the most abundant wastes that can be found in the landfills in Malaysia and this disposal certainly poses serious detrimental to the environment. This research aims to investigate optimum temperature for pyrolyzing waste PCBs, find out the best catalyst to be used in accelerating PCBs' pyrolysis, select suitable ratio of catalyst to PCBs for higher oil yield and examine kinetics pyrolysis of the waste PCBs' decomposition. Operating temperatures ranged from 200 to 350 °C of PCB's pyrolysis were conducted with the optimum temperature obtained was 275 °C. Fluid catalytic cracking (FCC) catalyst, zeolite socony mobil-5 (ZSM-5), H-Y-type zeolite and dolomite were used to accelerate PCB's pyrolysis at 275 °C and FCC was identified as the best catalyst to be used. Different ratios of FCC to waste PCBs such as 10:90, 20:80, 30:70, 40:60 and 50:50 were applied in the pyrolysis at 275 °C and ratio of 10:90 was selected as the suitable ratio to be utilized for maximum yield. The kinetic study was done through thermogravimetric analysis on waste PCBs under various heating rates and different particle sizes. The GC-MS analysis revealed that compounds detected in the pyro-oil have the potential to be used as fuel.

**Keyword:** Scrap printed circuit boards; Pyrolysis; Pyro-oil; Kinetics