

# Study on the Pyrolysis of Waste Plastics in Personal Computer

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## ABSTRACT

In Taiwan, there are a lot of waste computers produced every year, and most of them are treated by incineration and landfill. These waste computers contain various plastics which produced by polymers. The plastics may pollute our environment, if they are not disposed properly. In order to decrease the environmental problems and recover the valuable natural resources, the method pyrolysis was used in this study to recover the reusable plastics contained in the waste computers. In general, the plastics of waste computers are composed of acrylonitrile-butadiene-styrene terpolymer (ABS resin). The principal elements in ABS was analysed by Elemental Analyzer (EA). The results indicated that the percentages of carbon, hydrogen and nitrogen were 84.32 %、7.71 % and 7.57 % , respectively. The analysis of kinetics of ABS pyrolysis in nitrogen was performed under the heating rates of 2, 5, and 10 K/min, respectively. The kinetic parameters were obtained by the weight-losing curves. The activation energy (E), frequency factor (A), and reaction order (n) are 40.3 kcal/mol,  $5.32 \times 10^{11}$  1/sec, and 1, respectively. Thus, the pyrolysis of ABS resin can be described by the overall rate equations as:  $dX/dt = 5.32 \times 10^{11} \exp(-40.3/(1.987 \times 10^{-3}T)) (1-X)$  Where X is the conversion, t is the reaction time(min), T is the reaction temperature(K), R is universal gas constant( $1.987 \times 10^{-3}$  kcal/mol-K). For the analysis of pyrolysis products, the main gas product is propane. After distilling, the most important oil products are toluene, ethylbenzene and styrene with a total yield of 70 % by weight.

Keywords : Pyrolysis ; Acrylonitrile-Butadiene-Styrene resin ; Activation energy ; frequency factor ; Reaction order

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