

Study on the Pyrolysis Kinetics of Waste Mobile Phones

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ABSTRACT

As information technology industry developed prosperously, waste mobile phones increased day by day, which carried out the problem of how to deal with the waste mobile phones urgently. There are a variety of mobile phones. Some contain high cost materials and some even contain toxic materials which cause serious pollution to the environment. Therefore, it must can reduce the environment pollution problems and recycle the useful materials if we dispose appropriately. The study is based on discussing the effect of metal Cu on the pyrolysis of waste mobile phones main component (plastic housing, circuit board, and screen). By thermogravimetric analyzer (TGA), we discuss the kinetics of waste mobile phones pyrolysis in nitrogen environment with different heating rate (each one is 2, 5, 10 K/min). By the TGA curves of individual components under different reaction conditions, the kinetic parameters (activation energy (E), frequency factor (A) and reaction order (n)) were obtained and the kinetic equations were obtained. The TGA curves of waste mobile pyrolysis can be calculated according to the weighting sum of individual components. The study shows that the coefficient of determination between experiment and calculation in nitrogen environment without metal Cu and heating rate are 2, 5 and 10 K/min, plastic housing are 0.99, 0.99 and 0.99, circuit board are 0.97, 0.95 and 0.81, screen are 0.97, 0.99 and 0.99, mixed plastic are 0.95, 0.96 and 0.94 and mixed plastic with metal Cu are 0.98, 0.98 and 0.97. It shows that one stage 's reaction is applicable to the pyrolysis reaction of mobile phones ' plastic housing and screen; then, two stage 's reaction is applicable to the pyrolysis reaction of mobile phones ' circuit board, mixed plastic and mixed plastic with metal Cu.

Keywords : waste mobile phones、pyrolysis、recycling、kinetics

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