Study on the pyrolysis of waste cables

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ABSTRACT

The waste cable was used as the sample in this study. The waste cable consists mostly of polyvinyl chloride (PVC), cross-linked polyethylene (XLPE), copper, and fillers. The pyrolysis experiments were performed in two different carrier gases (nitrogen and air), and at the heating rates of 2, 5, and 10 K/min. For the analysis of pyrolysis kinetics, the experiments were carried out by a thermogravimetric analysis (TGA) reaction system, in two different carrier gases (nitrogen and air) at the heating rates of 2, 5, and 10 K/min. The pyrolysis of waste cable with copper is two reaction stages, while nitrogen as the carrier gas. The mass loss ratio of the two reaction stages is 0.5:0.5. The reaction energy, reaction order, and frequency factor are E1 = 24.4 kcal/mol, n1 = 1.3, A1 = 2.9 ×10 8 1/min, E2 = 44.7 kcal/mol, n2 = 1.1, and A2 = 2.1×10 12 1/min, respectively. The pyrolysis of waste cable with copper is also two reaction stages, while air as the carrier gas. The mass loss ratio of the two reaction stages is 0.58:0.42. The reaction energy, reaction order, and frequency factor are E1 = 27.1 kcal/mol, n1 = 2.0, A1 = 3.8×10 9 1/min、E2 = 62.9 kcal/mol, n2 = 3.9, and A2 = 2.6×10 19 1/min, respectively. For the analysis of pyrolysis products, waste cables were pyrolyzed in the nitrogen and air at the heating rate of 5 K/min. The pyrolysis products were collected and analyzed. The main gaseous products were CO, CO2, H2O, HCl, and hydrocarbons (HCs). The HCs consisted of low molecular mass paraffins and olefins.

Keywords : 熱裂解

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