

Pyrolysis Behavior of Polyvinyl Chloride with Sodium Hydroxide and Application to Copper Recovery from Multiwire Tinned Copper Cables

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In this study, polyvinyl chloride (PVC) was pyrolyzed with sodium hydroxide (NaOH) to capture the generated hydrogen chloride (HCl) gas as sodium chloride (NaCl) and carbonize the organic contents to generate fuel gases such as hydrogen (H₂) and methane (CH₄). In addition, the pyrolysis behavior of PVC with NaOH, and its application to copper recovery from thin PVC-coated tinned copper multiwire cables were examined. With an increase in temperature, the PVC released HCl gas at approximately 300°C and underwent carbonization to generate fuel gases at approximately 500°C. Upon immersing the PVC in a NaOH solution, it was converted into a powdered carbonaceous material; therefore, the amount of HCl gas decreased by being captured as NaCl, whereas the amount of fuel gases generated increased by pyrolysis. At a heating temperature of 500°C, the PVC coating of the tinned copper wire was removed via the formation of a carbonaceous material and sodium salts after the addition of distilled water. The results suggest that this environmentally friendly and effective process for capturing HCl gas as NaCl and converting the covered PVC into carbonaceous materials and fuel gases is suitable for PVC treatment, and the proposed approach can be applied to copper recovery from multiwire tinned copper cables through pyrolysis with NaOH.

Keywords : Polyvinyl chloride, Halogen trap, Copper recovery