

A Study on the Characteristics of Fire Hazard for Plastic Materials

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Abstract

This study was designed to investigate fire hazard characteristics of the plastics materials such as a polyvinyl chloride (PVC), polypropylene (PP), fiber reinforced plastics (FRP) that is used as elements of buildings or structures in workplace. The fire characteristics of the plastic materials were carried out using the self-Ignition tester, the cone calorimeter and the combustion gas tester according to ASTM, ISO and KS standards. The materials used in this experiment were commercial materials the composition of which was not disclosed. As the results of this study, the self-ignition temperature of the plastic materials was from 432°C to 494°C, and the flash-ignition temperature of plastic materials was from 342°C to 437°C. The time to ignition of the polypropylene in the materials was shorter, and that of the polyvinyl chloride was longer. The heat release rate of plastic materials was increased with increasing density and heat flux. The peak heat release rate for the polypropylene in materials with heat flux of external irradiance was highest. As results of the classification to flashover propensity by Petrella, the flashover propensity of the polypropylene in plastic materials was rated as high. It was found that the relationship of

flashover propensity and total heat released could not be simply considered. The characteristics of fire hazard in plastic materials can be used to provide guidelines of combustibility and heat release rate with a kind of products and heat flux of irradiance to prevent fire risk.

Key Words: plastic materials, fire hazard, ignition temperature, time to ignition, Cone calorimeter, heat release rate, flashover