

CHAPTER I

INTRODUCTION



In recent years, the amount of production of plastic materials is more and more increasing to meet the consumers' demand in the market for ever-increasing variety. The amount of plastic materials which leads to unavoidable increased generation of waste plastics as industrial and home wastes in every places and the processing of wastes in a heavy burden on the manufactures, the distributors and the communities. These waste plastics, which are synthetic polymer-containing substances, pose an environmental issue because of the problem associated with disposal: a large volume of non-biodegradable material, air and underground water pollution. So it becomes very important to solve the pollution problem in our environmental caused by the waste plastics, and to get them recycled and utilized.

Polystyrene is a plastic material having many uses and is particularly useful, when in a foam form, as a material for making food containers. It is a significant constituent of municipal solid waste and is particularly prevalent in waste from fast food restaurants, cafeterias and similar food service establishments. Such establishments commonly use trays, containers and cups made of polystyrene foam.

Incineration of polystyrene produces only carbondioxide and water, and that because of its petroleum content, it burns at a very high temperature and can burn out impurities in the incinerators.[1] Carbondioxide is hardly harmless, as it contributes to global warming. When polystyrene was burned at temperatures of 800-900 °C, the production of combustion consisted of a complex mixture of polycyclic aromatic hydrocarbons (PAHs). Another problem with incineration is that much of the foam will have been tinted, and some types of ink release the heavy metals cadmium and lead, both of which are toxic.[2]

Some problems with recycling are economic. The start-up costs for a polystyrene recycling plant are enormous. Recycled plastic is always a lower grade than the virgin material, so some applications, such as that for food packaging, cannot use recycled plastic. On the other hand, waste plastics and rubbers can be respected as a potentially suitable source for transportation fuels and useful industrial chemicals.

Therefore, the main purpose of this research is to depolymerize polystyrene to ethylbenzene for processes that use it as a starting material.

Objective and Scope of this Research

The principle objective of this research was to study new catalyst types for depolymerized polystyrene and identify hydrocarbon products from depolymerization reaction. These would be achieved by cracking processes with various catalyst types, catalyst concentrations, reaction temperatures, initial pressures and reaction times. In addition, the hydrocarbon products would be identified by gas chromatography.



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