CHAPTER I

INTRODUCTON

Plastics are being produced and utilized worldwide at an increasing rate with each subsequent year. Plastics are manufactured for various uses including, but not limited to, automotive parts, consumer packaging, pipes, wires, containers, bottles, appliances and electrical/electronic parts. Plastics are produced from petroleum and are composed primarily of hydrocarbons but also contain antioxidants and colorants. Plastics once used are not effectively recycled and are difficult to collect from the consumer and then to separate into specific types. Postconsumer plastics are disposed of by landfilling, thereby removing a potential hydrocarbon fuel or chemical feedstock source from the market. Recycling of the waste plastics produces fuels and chemical feedstock from mixed waste plastics and offers an alternative to primary recycling where the plastics must be carefully separated in order to recover the monomer.

The waste arises from a number of sources including agriculture, automotive, construction, distribution, and domestic use. Most of the postconsumer plastic is landfilled or incinerated, and on average, only 7% is recycled to produce low-grade plastic products such as plastic sacks, pipes, plastic fencing, and garden furniture. The low-grade uses for mixed plastic recycled materials has led to research into alternative processing methods to produce higher value products. There are six main plastics, which arise in municipal solid waste, high-density polyethylene (HDPE), low-density polyethylene (LDPE), polypropylene (PP), polystyrene (PS), poly(vinyl chloride) (PVC) and poly(ethylene terephthalate) (PET). In some cases, sources of waste may generate a single type of plastic waste, but in the majority of cases, the plastics will be a mixture of types.[1,2]

Waste plastics are an environmental problem because of their quantity, complexity in terms of having multiple polymers and mineral additives, and inherent stability. Waste plastics are petroleum-derived and, therefore, provide a hydrocarbon resource that can be used for chemical feedstock or fuels. Waste plastics are currently

being used as a feedstock for recycling back to the original monomer, as bulk plastic materials for constructing various items, and as a fuel for incineration, the generated heat of which can be utilized as an energy source. Recycling waste plastics to the monomer can be accomplished for some plastic materials. However, recycling plastic materials to the monomer on a large scale requires separation and cleaning of the plastics prior to processing to obtain a single polymer and clean feedstock, which cause the process to be both difficult and expensive. Consequently, only a small amount (~2%) of waste plastics is currently being recycled into monomers that can be used directly as recycled materials.[3]

Therefore, the purpose of this present study was to investigate converting of low-density polyethylene (LDPE) with coal to petroleum oil.

The objectives of this study

1. To study the coprocessing of low-density polyethylene (LDPE) with coal to petroleum oil.
2. To investigate the effect of reaction temperature, reaction pressure, reaction time and ratio of LDPE to lignite coal on the reactivity, conversion and product distribution in the system.

The scope of this study

- To investigate the suitable condition of reaction for the conversion of low-density polyethylene with coal to petroleum oil as following conditions;
  - Reaction temperature from 400 to 480^{0}C
  - Pressure of hydrogen gas from 30 to 75 kg/cm^{2}
  - Reaction time from 30 to 180 minutes
  - Ratio of low-density polyethylene with coal from 15:0.5 to 15:5