

## **THE CONVERSION OF WASTE PLASTICS/PETROLEUM RESIDUE MIXTURES TO TRANSPORTATION FUELS**

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### **1. INTRODUCTION**

Plastics have become the material of choice in the modern world and its applications in the industrial field are continually increasing. Presently the plastics are manufactured for various uses such as: consumer packaging, wires, pipes, containers, bottles, appliances, electrical/electronic parts, computers and automotive parts. Most of the post consumer, plastic products are discarded and end up as mixed plastic municipal waste. The disposal of this waste has become a major social concern.

Mixed plastic waste (MPW) recycling is still very much in its infancy. Approximately 20 million tons of plastic waste is generated in the United States of America, while about 15 million tons is generated throughout the Europe. With existing recycle efforts, only 7% of the MPW are recycled to produce low-grade plastic products such as plastic sacks, pipes, plastic fencing, and garden furniture. The current plastic reclamation technology options are generally grouped into the following four types:

- primary – The processing of plastic for use comparable to the original application.
- secondary – The processing of plastics waste into new products with a lower quality level.
- tertiary – The chemical or thermal processing of plastic waste to their basic hydrocarbon feedstock. The resulting raw materials are then reprocessed into plastic material or other products of the oil refining process.
- quaternary – The incineration of plastics waste to recover energy.

This chapter deals exclusively with tertiary recycling by pyrolysis and catalytic cracking of plastics waste alone and by coprocessing with petroleum residue or heavy oils to fuels and petrochemical feedstock for further processing in existing refinery and petrochemical units.