SUMMARY

As a solution of the environmental problems caused by plastic waste (such as polyethylene waste), the work in this thesis presents the hydroconversion of polyethylene waste into fuels; namely, gasoline, kerosine and gas-oil fractions, as well as hydrocarbon gas product.

Two catalysts namely; $NiWS/Al_2O_3$ (3.1% NiO and 10.0% WO_3) and Pt/H-MOR (0.35 % Pt supported on H-MOR zeolite) have been used for the catalytic hydrocracking of low density polyethylene in a batch autoclave system.

The effect of reaction temperature between 425 and 500°C was investigated at an operating pressure of 7.0 MPa and 1.0 h reaction time, whereas the effect of operating pressure between 3.0 an 9.0 MPa was investigated at a reaction temperature of 450°C and 1.0 h reaction time. Also, the effect of reaction time between 0.5 and 4.0 h was investigated at a reaction temperature of 450°C and 7.0 MPa operating pressure.

The polyethylene hydroconversion product was classified into four groups: gases, liquid hydrocarbons, polyethylene residue and deposited coke. The liquid product was fractionated into a gasoline (b.r.35-175°C), a kerosine fraction (b.r.175-240°C) and a gas-oil fraction (b.r.240-300°C). The composition of the gaseous product and gasoline fraction were gas chromatographically analyzed. Moreover, the gasoline fraction was examined by FTIR spectroscopic analysis.

The major gasoline part of the product using the various operating conditions studied ranges between 27.3% and 52.5%. The kerosine product comprises 11.9% and31.7%. The gas-oil fraction is a minor product and sometimes absent in product. The coke deposition ranges between 0.7 % and 2.4%.