

## CHAPTER IV

### CONCLUSIONS

In this work, the following could be concluded from all of the results and discussions :

1. Blends of virgin/post-consumer HDPE can be reprocessed for 10 passes with minimal degradation and small changes in physical properties.

2. The amount of post-consumer HDPE in blends of virgin/ post-consumer HDPE had insignificant effect on the properties.

3. During reprocessing, blends of virgin/post-consumer HDPE at all ratios tended to have a slight increase in molecular weight because crosslinking and chain branching were favored over chain scission.

4. To reduce the plastic waste in the environment and the cost of material, the Plastic manufacturers can add the post-consumer HDPE from water bottles up to the 75 - 100 % post-consumer HDPE with the properties not largely different from those of virgin HDPE. The reprocessed HDPE from post-consumer water bottles can be used in many products depending on the required application.

### Future Works

1. Determine MWD of reprocessed HDPE samples by means of Gel Permeation Chromatography ( GPC ) using 1,2,4 trichlorobenzene as a solvent.
2. Determine the vinyl content ( C=C ) by using Fourier Transform Infrared Radiation ( FTIR ).
3. Determine the long- and short-chain branching with  $^1\text{H}$  - Nuclear Magnetic Resonance ( NMR ) using 1,1,2,2 tetrachloroethylene as a solvent.
4. Reprocess HDPE at different conditions and then measure rheology, thermal properties and mechanical properties to study how the temperature or screw speed affects these properties and the degradation of material.