CHAPTER I
INTRODUCTION

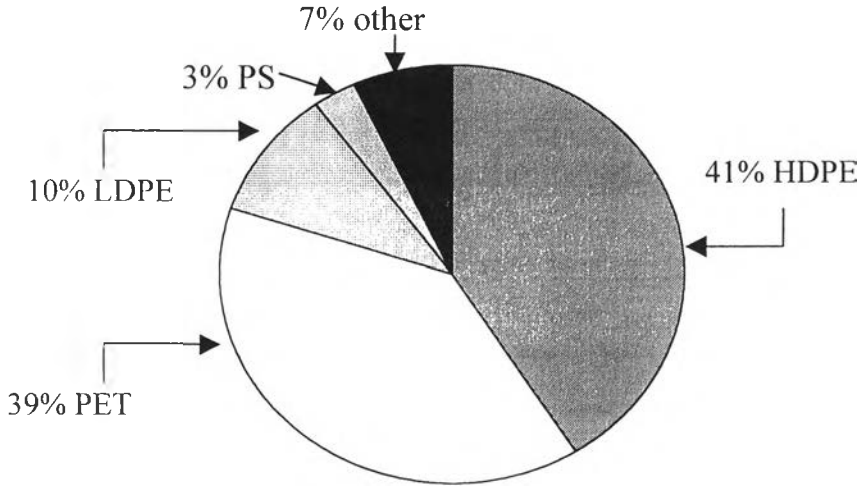
High density polyethylene (HDPE) is widely used especially in packaging industries. This is due to its excellent properties, such as good chemical resistance, good impact resistance, low cost, and so on. However, a large amount of HDPE consumption also gives rise to a large amount of solid waste being produced each year. Fortunately, HDPE is reusable and recyclable. Applications of recycled HDPE are, for examples, containers, blow-molded bottles, bottle crates, drainage pipes and grocery bags.

In the United States, plastics recycling industry have grown rapidly since 1990. There were a lot of recycled plastics in 1997 as show in Figure 1.1. The American Plastic Council (APC) announced that recycled HDPE from bottles increased from 704 million lbs to 734 million lbs in 1998, corresponding to a 4.6% increase. Plastics recycling is considered as both environmental friendly and cost-saving business. Nevertheless, it is still new and requires much improvement in terms of related processing technologies and product quality.

On a recycling line, cleaning and separating step is very important because the impurity has to be eliminated before raw material can be moved to the processing step. Unfortunately, contaminations, such as residual ink on the plastic surfaces, become a major problem at this step. In the recycling industry, there are two ways for dealing with this problem. The first is to cut away the area containing ink. Even though this method is more popular due to it low processing cost involved, the cut pieces become problematic to the environment again. The second is to directly remove the ink from the surface. The ink can be removed either by organic solvents or surfactant solutions. However, surfactants are usually environmentally friendlier than organic

solvents, which means that use of surfactants in deinking processes is the better choice.

In any case, properties of deinked plastic is very important because they will be used as criteria for use of the deinked plastics. It is therefore very important that the properties of deinked plastic should be thoroughly investigated. Moreover, the effect of the ink remained in the plastics on their properties is very interesting because different amounts of residual ink may result in the change in the properties if recycled plastics.



1.3 billion lbs recycled

- Post-industrial and post-consumer
- Source: APC @ www.plasticsresource.com

Figure 1.1 Recycling in the USA, in 1997.

The objective of this work was to study of the effect of residual print screen ink on various properties of re-extruded HDPE .

In this experiment, the effect of ink at various percentages of ink removal from plastic surface, i.e., 0, 50 and 100%, on properties of re-extruded HDPE by submersion in the solutions of a cationic surfactant, cetyltrimethylammonium bromide, was investigated. Moreover, the effect of residual ink on properties of 5 passes re-extruded HDPE was determined. The properties determined in this work were thermal properties, mechanical properties and color difference characteristic.