

CHAPTER I

INTRODUCTION

Nowadays, packaging technology has been more and more important to enhance the attractive feature of products. High-density polyethylene (HDPE) is of interest as a raw material because of its lightweight, high strength, high durability, good moldability and colorability. It leads to the rapid increase in the amount of HDPE used for packaging. Unfortunately, both petroleum and natural gas, the major raw materials for producing HDPE, are depleting. Therefore, recycling technology is considered to solve the restrained use of these non-renewable resources. Recycled plastics also eliminate the waste disposal which is a major problem in a big city, as it needs large area for landfill. To achieve high quality of recycled plastics, a pretreatment become an important step. It has been reported that the plastics after deinking gives recycled materials with good mechanical properties (Gecol,1998).

To remove ink from plastic surfaces, a use of organic solvents is an effective method for removal of organic-based inks. They are not widely used, however, due to their high volatility and toxicity. Hence, the vapor of these organic solvents in a closed environment must be controlled to a safe level, according to standards given by Environmental Impact Agency (EPA). From this reason, the use of surfactants through a surfactant-based separation process is a promising alternative for the removal of these organic-based inks.

In this study, the mechanism of ink removal was elucidated with regard to the factors affecting the process for achieving a maximum in the deinking efficiency using different cationic surfactants: dodecyl-, tetradecyl-, and cetyl-trimethylammonium bromide (i.e., DTAB, TTAB, and CTAB, respectively) which have different alkyl chain lengths. These surfactants are chemically different in the number of carbon atoms of the alkyl tail group (i.e., 12, 14, and 16, respectively, for DTAB, TTAB, and CTAB). In addition, the effects of the CnTAB concentration, pH of deinking solution, temperature of the process, and salt addition on the removal of solvent-based blue ink from printed high-density polyethylene surfaces were investigated to elucidate the deinking mechanism.