CHAPTER I

INTRODUCTION

1.1 Scientific Background and Rationale

Nowdays the industries expand rapidly which inflict pollution to the environment. The important pollution problem is the residue solvent in drainage from the processes, for example, toluene, one of the most useful solvents in many industries. This solvents can be accumulated in the body and afterwards damage lung, liver and kidney, etc [1]. So the industries should remove these solvents before draining.

For many years, the scientists have been interested in core/shell composite particles have which have precisely tailored physical properties. The formulations of these multi-component, inhomogeneous particle structures, provide characteristics unlike those of random copolymers or polymer blends. The core/shell structure contains pores which may absorb and desorb solvents.

One approach to solve parts of above problems, the absorptive materials must be produced to get rid of some or all of these solvents. Consequently, the synthesis of solvent absorption-desorption core/shell beads is suggested to solve this problem. The core/shell structure should contain some pores and consists of two kinds of polymers that are compatible. The selection of monomer type should conform to the respective solvents to be absorbed. Crosslinking reaction is necessary for an appropriate absorption and polymer density. This material swells while absorbing solvents. To its optimal application it should float on the water surface. Therefore, the swollen beads can be separated from the water surface easily for solvent recovery.

1.2 Objectives of Research Work.

1. To synthesize the solvent absorption-desorption core/shell beads of acrylates by seeded suspension polymerization in comparison with those of one-stage suspension polymerization.

2. To study the effect of important parameters of the synthesis of solvent absorption-desorption core/shell beads of acrylates by seeded suspension polymerization and one-stage suspension polymerization, such as suspending agent concentration, crosslinking agent concentration and diluents.

3. To characterize the properties of core/shell beads and one-stage beads, such as beads size and size distribution of beads.

4. To study the solvent absorption and desorption kinetics and the diffusion coefficient of core/shell beads and one-stage beads.

1.3 Scopes of Research Work.

In this research work, the focus is the synthesis of solvent absorption and desorption core/shell beads of acrylates by seeded suspension polymerization and one-stage suspension polymerization. The necessary process to achieve the goal may be as follows.

1. Literature survey and in-depth study of this research work.

2. Synthesizing the core/shell beads of acrylates by one-stage polymerization by changing the following parameters.

- The effect of suspending agent concentration of poly(N-vinylpyrrolidone) PVP K-90.
- The effect of crosslinking agent concentration of ethyleneglycol dimethacrylate (EGDMA).
- The effect of diluents composition (toluene and isooctane).
- The effect of initiator concentration of benzoyl peroxide (BPO).

- The effect of inhibitor concentration of hydroquinonesulfonic acid potassium salt.

- The effect of polymerization time.

- The effect of polymerization temperature.

- The effect of agitation rate.

3. Synthesizing core of acrylates beads by suspension polymerization.

4. Bringing the core of beads from step 3 to seeded suspension polymerization in styrene monomer.

5. Characterizing of core/shell beads by scanning electron microscopy (SEM) and differential scanning calorimetry (DSC).

6. Studying the swelling properties of core/shell beads, and one-stage beads.

7. Studying the kinetics of absorption and desorption of core/shell beads, and one-stage beads.

1.4 Contents of Research Work.

This thesis consists of 5 chapters. The first chapter deals with the background, the interest and the scope of this research work. Chapter 2 provides the theory of suspension polymerization technique, core/shell particle and related theory that are important for understanding. Additionally, it includes literature reviews of the previous works that give useful information and trends for the work. Chapter 3 is the experimental part that described about chemicals, equipment, apparatus, procedure for important parameters of reaction investigated in this work. The results and discussion are explained in Chapter 4. The effects of various reaction parameters on particle size, size distribution, core/shell structure and swelling properties are elucidated and discussed in detail. Finally, the summary and suggestion are in Chapter 5.