CHAPTER I

INTRODUCTION

1.1 The Purpose of the Investigation

Nowadays the industrial development is expanding tremendously and rapidly to acquire the convenience of the mankind.Polymer is the product from one of the most promising industrieswhich provides endlessly useful applications,i.e., plastic, coatings, fiber industries, etc. However, all these industries also produce various kinds of pollution problems, the main cause of which stem from the residue solvent in the drainage from the production, for example toluene, one of the most useful solvents in many resin industry, coating industry and other chemical industries. This solvent can be accumulated in the body and afterwards damage lung, liver and kidney(1),etc.

Oil spill is the latest water polution problem around the world. The oil layer on the sea reduces the amount of dissolved oxygen which is vital for all living things beneath, and consequently damages the environment around.

One approach to solve parts of the above problems, the absorptive material must be produced to get rid of some or all of these solvents and oil. Consequently, the main purpose of this research is to search for the

procedure of the absorbent preparation and test the absorptive property of the material. This material, while absorbing the solvents or oil, will swell and perhaps float on the water, depending on the absorbent's density. Therefore the swollen beads can be separated from the water conveniently for the recovery of the solvents and oil.

1.2 Objectives

1.2.1 To develop suspension polymerization procedures for the preparation of 3-5 mm. diameter imbiber beads.

1.2.2 To synthesize the imbiber beads that can be used in absorbing various industrial solvents.

1.2.3 To characterize some properties of the synthesized imbiber beads.

1.3 Scopes of the Investigation

Since the technique of repeated suspension polymerization through bead swelling to produce porous crosslinked beads is a relatively new idea, the appropriate parameters are not thoroughly known theoretically in the field. The necessary procedures to achieve the goal may be as follows:-

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

1.3.2 Synthesizing the imbiber beads of polystyrene crosslinked with divinylbenzene by means of suspension polymerization by changing the following

parameters so as to attain the appropriate reaction condition:

a) The optimum quantity of the crosslinking agent;

b) The times and temperatures of the polymerization process;

c) The optimum amount of the suspending agents, HPMC and the combination of HPMC/HEC

d) The effect of monomer-to-water ratios at 1:10, 3:10 and 5:10

1.3.3 Bringing the synthetic beads to the further seeding steps:

a) Classifying the synthetic beads into groups based on sizes;

b) Bringing each group of beads into the solution mixture of the monomer and the initiator;

c) Bringing the swollen beads from b) to further polymerization in the suspending medium;

d) Repeating steps b)- c) until the required size of the swollen imbiber beads are to be achieved

1.3.4 studying the absorption and desorption of the synthetic swollen beads in the selected solvents, toluene, hexadecane, and others, based on the values of solubility parameter.

1.3.5 comparing the sorption properties of the synthetic polystyrene beads, crosslinked with divinylbenzene, with the following adsorbents: non-crosslinked polystyrene bead.

1.3.6 studying the pore size distribution technique of the synthetic imbiber beads.

1.3.7 summarizing the results and preparing the report.

1.4 Significance of the Problem

To synthesize the floating/sinking and large imbiber beads, the optimal of the above-proposed parameters in section 1.3 must be achieved so as to monitor the proper porosity of the beads. The divinylbenzene crosslinked polystyrene beads synthesized via seeded suspension polymerization are basically narrower in bead size distribution and are indeed of much larger size due to the technical merits of the procedure, if the procedureto control the bead size is reached. These imbiber beads should therefore be used to absorb certain types of solvents either in a pure or mixed states. These beads can perhaps absorb oil layer over the water surface which should bring about the reduction of water pollution problem accordingly. It is hoped that the absorbed solvents/oil are possibly desorbed depending on their diffusivity and vapor pressure and hence the recovery of the materials becomes technically realization.