CHAPTER I

INTRODUCTION

1.1 Statement of the problem

Functionalized polymers are modified polymers that have variety of chemical functional groups attached to polymer backbone. They combine latent advantages of small molecules of functional group and physical properties of polymer. They have been used in wide applications, such as catalysts, reagents in synthetic reaction, and separations etc. Especially, they are used in solid phase extraction (SPE) of toxic heavy metal extraction from waste water[1].

For the utilization of modified polymers in solid phase extraction of metal ions, the substances that metal ions can be sorbed, which generally are ion exchange or chelating compounds, are used to attach with polymers that function as solid support. Such resin is called chelating or coordination polymer. Although many types of polymer have been employed as polymeric sorbent, the most widely use as solid support is polystyrene-divinylbenzene (PS-DVB) owing to its chemical and physical stability.

Nevertheless, sorbents based on PS-DVB have some drawbacks, such as their lack of selectivity and low breakthrough volumes for highly polar compounds, which leads to their incomplete extraction from predominantly aqueous samples. These drawbacks can be largely overcome by using modified resins obtained by attaching polar groups, such as acetyl, hydroxymethyl and benzoyl derivative, to the aromatic ring on the PS-DVB[2].

Because polystyrene's hydrophobic surface character contains a relatively large number of active aromatic sites that allow π-π interactions, the development of their surface by attaching of various chelating compound to aromatic ring can be done. The most chelating compound (called chelating ligand or chelating agent) is usually organic compound which has electron donor groups as oxygen, nitrogen, sulfur and phosphorus atoms at least 2 groups coordinate with the same metal. There are two methods for designing chelating polymers. The first one involves physical sorption of chelating ligand onto polymer and the other is covalently coupling of

ligand with polymer backbone through a spacer arm. The latter approach is preferred due to free from ligand leaching.

Several reports on development of chelating polymer with different chelating ligands have been reported in recent past. From those, the feature of incorporate of chelating ligands is flexibility and orientation of electron donor groups in molecule of chelating ligand. It is possible in many types when coordinate with metal ion, results in less selective metal adsorption.

In this research, we will synthesize new chelating polymers which electron donor groups in chelating ligand moiety are nitrogen atom in two Schiff base groups and two sulfur atoms. These chelating ligands are symmetric cyclic ring in each other but different in size of cyclic ring. Furthermore, the synthesis of chelating polymer which has nitrogen atom in two Schiff base groups and two nitrogen atoms in ligand was also conducted. The investigation of metal ion adsorption property of synthetic polymers will be tested with Pb(II), Cd(II), Cu(II), Zn(II), Ni(II), Co(II) and Cr(III) ions in aqueous solution.

1.2 The objectives of the thesis

1.2.1 To synthesize new chelating polystyrene-divinylbenzenes containing Schiff base and sulfur atoms in chelating ligand.

1.2.2 To investigate metal ion adsorption property in aqueous solution of synthetic chelating polymers.

1.3 Scope of the thesis

1.3.1 Synthesis of chelating ligands.

1.3.2 Synthesis of chelating PS-DVB.

1.3.3 Test of metal ion adsorption of synthetic chelating polymers.

1.4 The outcomes of this research

In this research, the new chelating polymers which have metal ion adsorption property were achieved using chelating ligand modified PS-DVB.