

CHAPTER I

INTRODUCTION

1.1 Statement of the problem

The current wastewater problem with the contamination of heavy metal ions is a result of growing industry. The inappropriate technology used in water treatment will result in the release of heavy metals to the environment. The separation of heavy metals from wastewater can be done by different techniques such as precipitation and ion exchange techniques. However, these techniques have some limitations when operating, resulting in inefficient elimination of heavy metals.

Humic acids can be utilized in wastewater treatment because its active carboxylic and hydroxyl functional groups can react with various heavy metal ions to form different complex compounds. The use of humic acids for adsorption of metal ions in wastewater has been investigated.

1.2 Objectives and scope of the research

The objective of this research is to study the extraction of metal ions (Ag(I), Au(III), Cd(II), Cr(III), Ni(II), Pb(II) and Zn(II)) from water using humic acid immobilized on aminopropyl silica.

The optimization for the retention of metal ions using batch and column methods was carried out. The effect of several parameters such as pH of solution, contact time, flow rate and interfering ions was investigated. The optimum condition was employed for the

extraction of metal ions by using the column method. Finally, the proposed extraction procedure was validated by the use of spiked synthetic solution and spiked real sample.

1.3 The benefits of this research

In this research, a method for extraction of heavy metal ions in an aqueous solution using humic acids immobilized on aminopropyl silica was one option for wastewater treatment system. This method has advantages over the conventional methods in terms of safety, low cost and environmental care.