



CHAPTER I INTRODUCTION

Increasing in environmental concern causes many industries to have more awareness in their waste. Waste from industrial composes of many components, both organic and inorganic compounds. They can cause harm effects in environment and human health. For this reason, some trace contaminants in waste water have to be removed before being discarded into water resources.

Many methods have been used for the wastewater treatment such as chemical precipitation, physical methods and biological treatment. However, these methods have some limitations. Chemical precipitation generates a large volume of sludge for disposal. The operation and maintenance costs are high for physical methods as in case of electro dialysis and reverse osmosis. Among these methods, the adsorption offers the greatest advantages of contaminants removal and the flexibility design and operation. Moreover, it is an efficient and economic method (Uğuzdoğan *et al.*, 2008).

The adsorbents that have been used for water treatment include plant wastes, activated carbon, clay, etc. (Jai *et al.*, 2007). Although plant wastes and clays are known as low-cost materials; they have low adsorption capacity. Polymeric ligand exchangers (PLEs) are another group of adsorbent that have shown great potential for wastewater treatment (Henry *et al.*, 2004), due to their triple functions of ion exchange, chelate formation and physical adsorption. Generally, the PLEs are composed of supporting polymer with chelating functional groups and a transition metal immobilized on it.

The series of polybenzoxazine, a novel type of phenolic resins, can be prepared from phenols, amine, and formaldehyde. They have become attractive materials because of the flexibility in the molecular design. Furthermore, no strong acid catalyst is required in polymerization process and the reaction does not release any by-product (Ghosh *et al.*, 2007).

The purpose of this work is to study the effect of types of metals, weight of adsorbent and contact time. The maximum capacity of metals removed was also stu-

died by using adsorption isotherms. Then, the feasibility of using polybenzoxazine-based aerogel as a PLE was determined.