

## Removal of Toxic Metal Ion using Poly m-phenylene (Isophthalamide) Ultrafiltration Membranes

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### Abstract

Poly m-phenylene (Isophthalamide) (PMIA) Ultrafiltration membranes were prepared by Non-solvent induced phase inversion technique in the presence of lithium Chloride (LiCl) with different compositions of Poly ethylene glycol (PEG-600) using N-methyl pyrrolidone (NMP) solvent. The effects of compositions of PEG-600, pure water flux and percentage water content of the membranes were studied. The application of PMIA membranes in separation of toxic heavy metal ions from solutions was also attempted and the results were discussed.

**Keywords:** Poly m-phenylene (Isophthalamide), Ultrafiltration and heavy metal separation.

### I. INTRODUCTION

Membrane separation process is the well advanced and futuristic technology for the separation of constituents and purification of water with modern compact equipments. Flux and rejection of membrane process are mainly influenced by size and charge of the molecule to be separated and membrane pore size. Surface properties of a membrane also play a vital role. It is because the major drawback of membrane separation process is fouling, induced by adsorption of particulate matter onto the membrane surface or deposition into the pores, and is mainly controlled by surface properties. The majority of the polymeric ultrafiltration membranes are prepared by phase inversion technique [1]. In Nonsolvent Induced Phase Inversion process, a homogeneous polymer solution is cast as a thin film in a coagulation bath. The exchange of nonsolvent and solvent induces the phase separation phenomena in the polymer solution, which usually leads to the formation of an anisotropic (asymmetric) structure with a relatively thin skin supported on a much thicker porous substrate in the resulting membrane. Membranes prepared by this process usually contains large elongated voids (macro voids) in their sub layer structure.

Poly m-phenylene (Isophthalamide) (PMIA) is the aromatic polyamides having high thermal stability and excellent mechanical properties [2]. PMIA fibers are very resistant to solvent dissolution. The chemical structure of PMIA is shown in Fig. 1. Removal of toxic metal ion such as Cu, Zn, Hg, Cd, Pb and Ni from industrial waste waters is required for meeting the present need for water reuse. Lead is one of the toxic heavy metal which affects aquatic species and mankind drastically when it presents in water [3].

In the present study, attempts were made to develop new PMIA Ultrafiltration membranes with LiCl in the presence of different compositions of PEG-600 using NMP solvent and studied for removal of lead (Pb) from water.

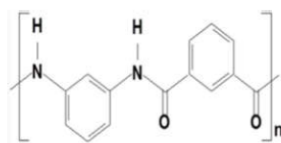


Fig.1. Chemical structure of Poly m-phenylene (Isophthalamide) (PMIA).