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Study of Mechanical / Structural Relationship in Polysulfone/ Polysulfone-g-Polyacrylate Blend Membranes

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ABSTRACT

The mechanical properties of modified polysulfone membranes decrease with increasing of constituents' hydrophilicity. So these properties was investigated for two special blend membranes which were made with polysulfone and (Polysulfone-g-poly (N-butylacrylate), Polysulfone-g-poly (tert-butylacrylate)) as modification ingredients. The investigated mechanical properties include tensile strength at break and the elongation at break. The effects of modified polysulfone content in blends on the mechanical properties of resulting membranes were measured and compared. Results showed that the tensile strength at break decreased with an increase of the copolymers content, despite the increase in the elongation at break.

The prepared membranes were characterized in terms of pure water flux (PWF), water contact angle, cut off molecular weight, salt rejection and scanning electron microscopy (SEM). Thermal properties of membranes were studied with DSC.

Keywords: Blend membrane, mechanical properties, modified membrane

1. INTRODUCTION

Polysulfone has been widely used in the membrane industry due to their superior thermal and mechanical properties, dimensional and thermal stability, and excellent chemical resistance. Unfortunately, polysulfone membranes tend to have a characteristic low resistance to fouling. Several studies have shown that membrane fouling is directly related to hydrophobicity [1-3]. It is reasonable to conclude that increasing of membrane hydrophilicity is a good method to improve membrane performance. Modification of polysulfone membranes in view of increasing their hydrophilicity have been carried out in several ways such as plasma treatment, ultraviolet irradiation, chemical reaction with hydrophilic groups, grafting with hydrophilic polymers and also blending [4-9]. Blends of polysulfone with a hydrophilic polymer might provide compositions with improved hydrophilicity in comparison with neat polysulfone [10].