INTRODUCTION

Fuels have been explored for better engine operation in order to save environment and prevent the global warming. They can be derived from fossil which is a non-renewable resource. One approach to solve the fuel crisis is by addition of ethanol in gasoline. The mixture of gasoline and ethanol used as fuels are also know as "Gassohol" which has become a popular choice for several countrys in the world. Ethanol used in gasohol is usually called "bioethanol". Since it is a product from fermentation of renewable biomass in agricultural such as sugar cane, corn, tapioca, etc.; therefore it has very low cost compared with traditional petroleum based fuel. However, bioethanol obtained from fermentation process is usually in the form of aqueous mixture with approximately 12% yield. Hence, the effective and economical separation technique is needed in order to apply ethanol from this source as fuel.

Several separation techniques of ethanol have been studied including liquid-liquid extraction, carbon absorption, air stripping and particularly distillation process which is a common technology used in the petrochemical industry. However, these techniques require high operating cost, high energy and have some limitations to make them unattractive for azeotropic isomeric mixtures separation so they are not suitable for industrial applications. Therefore, new technique was invented to solve these problems.

Pervaporation is a membrane separation technology with high selectivity, efficiency and energy saving benefits; making it the most appropriate method for the separation of mixtures which are heat sensitive and have close boiling points or azeotropic isomeric mixtures. Pervaporation has been mostly applied in the following three areas : dehydration of organic solvents, removal of dilute organic compounds from aqueous solutions, and organic–organic mixture separation (Feng and Huang, 1997). Accordingly, pervaporation is an interesting candidate for ethanol/water separation in industries. Moreover, this technique also has several advantages over traditional distillation process such as reduced energy consumption and simple equipment since only a vacuum pump is needed to create a driving force leading to lower capital cost. The pervaporation principle is the partial vaporization of a liquid through a dense polymeric membrane that can selectivity interact with a specific

component. Therefore, only the membrane permeated component undergo liquid-vapor phase change during pervaporation.

Polybenzoxazine (PBZ) is a novel type of phenolic resin that provides many characteristics of traditional phenolic resins such as heat resistance and flame retardance, good chemical resistance, low water absorption, etc. In addition, it also has properties that are not found in the traditional phenolic resins which are high thermal stability, good dielectric, low shrinkage, no need of catalyst for polymerization, no by-product or volatile generation, excellent dimensional stability and rich molecular design flexibility.

The proposes of this work are to prepare polybenzoxazine membrane for ethanol/ water separation, studies characteristics of benzoxazine and the processing parameters on the separation efficiency will be investigated.