CHAPTER III
EXPERIMENTAL SECTION

3.1 Materials

All materials were kindly donated by UOP Company. The silicone rubber used in this study was RTV. The solvent used was cyclohexane. Polyethylene glycol (PEG) MW 400 was used as plasticizer. Gases used in this study were carbon dioxide, hydrogen, nitrogen, and ethane. Five membrane backings were used in this study:

- Ultem-1000 (Polyetherimide polymer supplied by GE) membrane cast on polyester woven cloth
- 20% by weight polyacrylonitrile support membrane cast on Hollytex non-woven cloth
- 17% by weight polyacrylonitrile support membrane cast on Hollytex non-woven cloth
- Polysulfone support membrane cast on non-woven cloth
- 6F-Polysulfone support membrane coated with silicone

3.2 Membrane Preparation Procedure

A multicomponent membrane of an organic polymer coated on a porous support and a multicomponent membrane of a mixture of a glycol plasticizer and an organic polymer coated on porous support were prepared as shown in Figure 3.1. The solution was formed by admixing 1.08 grams of a silicone rubber sold under the trade name RTV-615A and 0.12 gram of a silicone rubber sold under the trade name RTV-615B and polyethylene glycol having

molecular weight of 400 in an amount of 5% to 50% by weight with respect to the silicone rubber in 10 ml. of a cyclohexane. The emulsified solution was blended by vigorous shaking for a period of 3 to 5 minutes. Following this, the casting solution was degassed by using vacuum pump and poured over backing as a 9 ml. thick film. The cast film was allowed to cure at a temperature of 84 °C for a period of 60 minutes in order to remove the residual solvent.

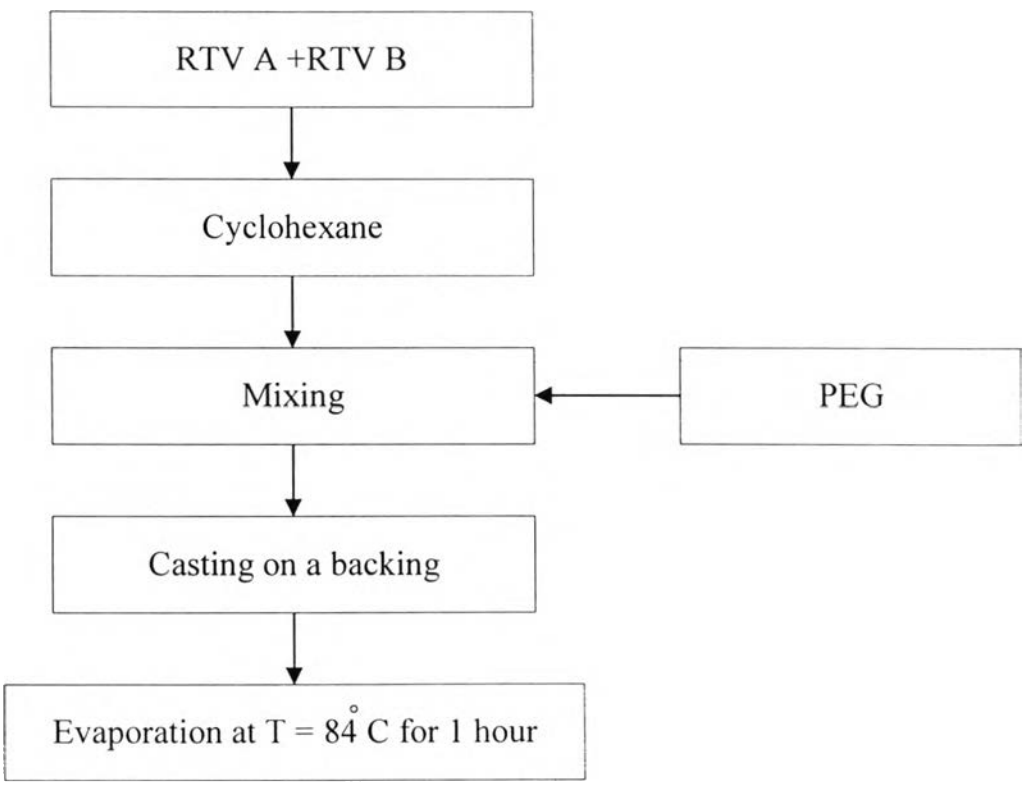

Figure 3.1 Membrane Preparation Procedure

3.3 Gas Permeability Measurement

The apparatus used in the determination of permeances of gases studied is shown in Figure 3.2. The multicomponent membrane was tested by utilizing a sample of each membrane having diameter of 7.5 cm. placed inside a

membrane testing unit shown in Figure 3.3 with O-ring forming a seal around the edge. The membrane was supported by a metal plate. The gas to be tested was passed through the membrane under a pressure of 50 psig while the low pressure side was at atmospheric pressure. After a time interval estimated to be sufficient for attaining steady state, flux of the gas was measured by using a bubble flow meter.

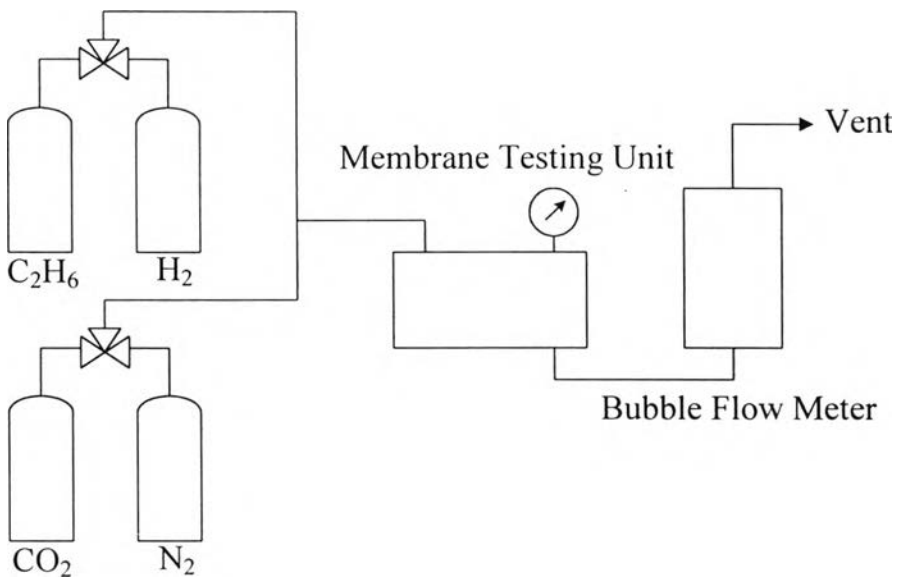

Figure 3.2 Experimental Setup

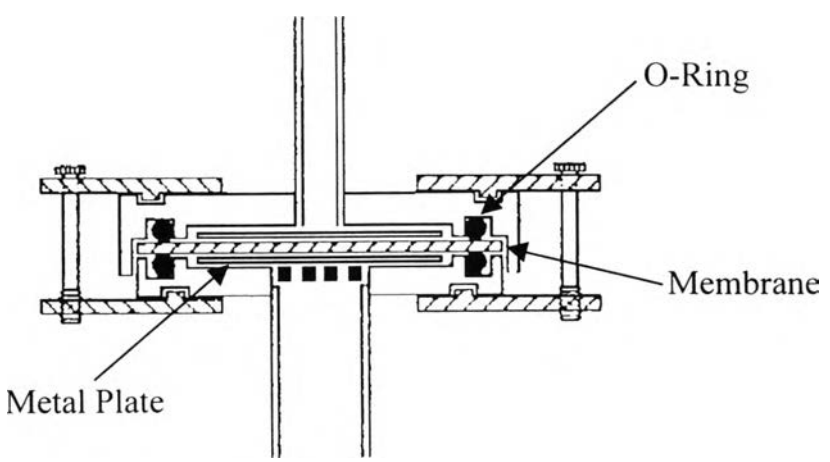

Figure 3.3 Membrane Testing Unit