CHAPTER I

INTRODUCTION

Polymeric membranes are currently employed to separate gases. In certain applications, polymeric membranes offer significant advantages over other separation techniques because they operate without the addition of energy to produce two more purified streams. Polymeric gas separation membranes have found many industrial applications including the production of purified nitrogen from air; the separation of carbon dioxide and water vapor from natural gas; the removal of hydrogen sulfide and other contaminants from natural gas and the separation of hydrogen from refinery gases. The membranes used at present for the separation of gas mixtures are made from glassy polymer, such as polysulfone, polyimides, cellulose diacetate and triacetate, and ethyl cellulose. These polymers exhibit a high selectivity for certain gases of industrial interest, but their intrinsic gas permeability is very low. However, very high gas fluxes can be obtained through membranes made from such membrane by making in other types for instance ultrathin, asymmetric and composite with effective thickness as small as 1000 Å (Rousseau, 1987).

The separation of a gas mixture utilizing a membrane is affected by passing a feed stream of the gas across the surface the membrane. In as much as the feed stream is at elevated pressure relative to the effluent stream, a more permeable component of the mixing will pass through the membrane at a more rapid rate than will a less permeable component. Therefore, the permeable stream passed through the membrane is enriched in the more permeable component while, conversely, the residue stream is enriched in the less permeable component of the feed. The permeability of a polymeric membrane is governed by many of the same properties that determine the susceptibility of the polymeric membrane to solvent. For instance, just as a polymer with many polar groups is sensitive to a polar solvent, that same polymer would be permeable to a polar gas or liquid. The qualitative solubility rule of "like dissolve like" is obeyed. Thus, gas molecule which have a solubility parameter close to that of the membrane material will tend to be more soluble, possibly resulting in higher fluxes. Conversely, a non-polar polymer would be a barrier to polar gases and liquids.

The objective of the present study is to observe the mechanism of gas permeation through a multicomponent membrane which consist of a glycol plasticizer and an organic polymer casting on various supports in order to see its permeability and selectivity to polar and non-polar gases and to see the effect of the backing.