

일반강연 I-15

실록산기를 포함하고 있는 폴리우레탄막을 통한 염소계 유기화합물의 투과분리특성

김춘기, 박호범, 이영무
한양대학교 응용화학공학부

Permeation properties of chlorinated hydrocarbons through polyurethane membranes containing siloxane

Choon Ki Kim, Ho Bum Park, Young Moo Lee
School of chemical engineering, College of engineering, Hanyang
University

1. Introduction

During the last decades, the industries generating volatile organic compound (VOC) containing waste air streams have been increasing economic and regulatory pressure. Particularly, various industrial processes such as painting, solvent degreasing, printing, dry-cleaning, polymer synthesis involve the use of large amounts of solvents such as aromatic (toluene, benzene, xylene) and chlorine-containing organic compounds (methylene chloride, trichloroethane, carbon tetrachloride).

The aim of this study is to examine the permeation and sorption capacity of these hazardous chlorinated hydrocarbons through segmented urethane siloxane and/or urethane/urea/siloxane membranes.

2. Experimental

Membranes

Urethane/urea/siloxane and urethane/siloxane were synthesized with different content of siloxane oligomer, and then prepared dense films with 10~20 μ m thickness by casting onto Teflon plate.

Solvents

As chlorinated hydrocarbons, methylene chloride(CH_2Cl_2), chloroform (CHCl_3) and carbon tetrachloride(CCl_4) were selected by increasing

number of chlorine atoms. All solvents were of analytical grade and used without further purification.

Vapor permeation apparatus

Permeation experiments were carried out using a single vapor permeation cell that was housed in a constant temperature chamber. The membrane area exposed to feed vapor was 0.0013m^2 . In all permeation experiments, the permeation cell temperature was fixed at room temperature, the feed pressure was 800 mmHg, and the permeate-side pressure was 0.001 atm.

3. Results and Discussion

The effect of feed stream vapor flow rate on permeate permeability for urethane/siloxane and urethane/urea/siloxane membrane is shown in Fig. 1 when the feed contained 1~10 vol% CH_2Cl_2 , CHCl_3 , and CCl_4 in dry nitrogen at 25°C . Permeabilities of all species were found to be dependent on the feed flow rate which meant the change of feed concentration. Also, the order of permeability through each membranes was as follows; $\text{CHCl}_3 > \text{CH}_2\text{Cl}_2 > \text{CCl}_4$.

