Development for Monitorning and Concentrated Separation of Endocrine Disruptors in Sea Water by Pervaporation Method (II) Concentration and Separation of Model PCB and Dioxin

Akon Higuchi and Mariko Hara

Department of Applied Chemistry,
Faculty of Engineering, Seikei University

Summary

Endocrine disrupting chemicals, such as dioxin and polychlorinated biphenyl (PCB), are affecting the development and reproduction of humans and animals, and are therefore, of major concern to the environment. In this work, we examined the feasibility of removing endocrine disrupting chemicals from aqueous solution and aqueous salt solution by pervaporation method through hydrophobic polydimethyl-siloxane (PDMS) membranes. The goal of this study is to examine the feasibility to separate endocrine disrupting chemicals from extremely dilute aqueous solutions through hydrophobic polydimethylsiloxane membranes by pervaporation.

Pervaporation experiments through PDMS membranes were performed using aqueous feed solutions of other organic chemicals. The relationship of the separation factor obtained by the PV experiments and the vapor pressure of the endocrine disrupting chemicals was investigated and is shown in Fig. 1. It is found that the separation factor in the PV increased when the endocrine disrupting chemicals having high vapor pressure were used for the separation experiments. This is explained by the fact that the vapor pressure is directly related to the driving force of the diffusion of the endocrine disrupting chemicals in the membranes. We also succeeded to improve the separation factors by PV method at high temperature on the feed side. In summary, hydrophobic endocrine disrupting chemicals, such as polychlorinated dioxin and PCBs, can be removed very effectively from an aqueous feed solution and aqueous salt solution using hydrophobic PDMS membranes by pervaporation.

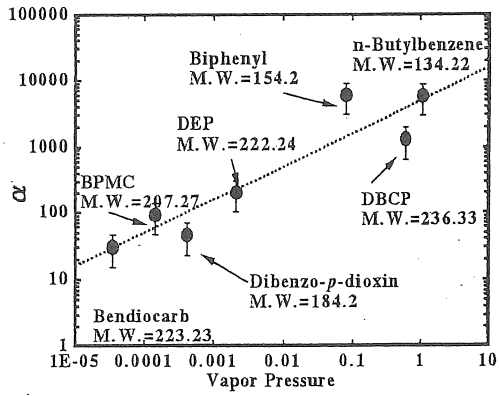

Fig. 1 Relationship between Separation Factor and Vapor Pressure of Solutes in PV through 300μm PDMS Membrane at T(feed)=90°C and T(permeate)=150°C.