Adsorption isotherm of non-azeotropic solution onto porous adsorbents

Abstract

Adsorption isotherm is essential component in the understanding of the adsorption process. Several methods of the measurements, analysis and interpretation of adsorption from solution have been reported in the literature. Most of the measurements of adsorption isotherm from solution were involved the measurement of excess isotherm conducted at low region of sorbates concentration. Direct interpretation of excess adsorption isotherm as adsorption isotherm is always been practice. Therefore, in this work a study on the measurement of the adsorption isotherm from solution of non-azeotropic organic solvent mixture onto porous adsorbents for whole range of liquid concentration was conducted. The study included the measurement of excess adsorption isotherm using conventional technique. Theoretical analysis and interpretation of adsorption isotherm from the excess isotherm were conducted using Pseudo Ideal Adsorption, Gibbs Dividing Plane Model and Langmuir-Fruendlich binary isotherm model. For organic solvents, acetone and propanol were chosen as the adsorbates due to the non-azeotropic properties in the mixture. Activated carbon and silicalite were chosen as adsorbents due to the different in their porosity such as macro porous and micro porous structure. The result of the study has revealed that the adsorption isotherm of non-azeotropic mixture onto activated carbon and silicalite can be interpreted as monolayer type of adsorption.