



CHAPTER 1

INTRODUCTION

1.1 Introduction

Adsorption separation processes are used widely in the chemical, biochemical, and petrochemical industries, both for purification (removal of trace impurities) and for bulk separations. The adsorption purification systems have been used in operation for many years for air and water treatment, sugar decolorization, etc. The advent of large-scale adsorption processes for bulk separation is a more recent development which became practically feasible only after improved adsorbents, for example the discovery and commercialization of synthetic zeolites, with sufficient selectivity to differentiate chemically similar species had been developed.

The use of adsorption in bulk separation has its main advantages as compared with other separation techniques; the high selectivity that can be attained and the relatively high capacity of the adsorbents for volatile compounds, even at low partial pressures. Some applications of interest include the separation of xylene isomers, the recovery of linear paraffins from light naphtha, the separation of olefin from cracked gas and the recovery of acetylene and other petrochemical from dilute mixtures with other hydrocarbon gases.

The present study is expected to yield preliminary useful data for the zeolitic adsorbents and for a fundamental design of adsorption column for hydrocarbon gas separation.

1.2 Objectives

1. To study the adsorption of n-butane on zeolites.
2. To measure the equilibrium adsorption isotherm, the overall adsorption rate of n-butane and to estimate the effective diffusivity of n-butane on zeolites.
3. To find the effects of temperature on the equilibrium adsorption isotherm and the overall adsorption rate of n-butane on zeolites.
4. To apply the acquired information to the fundamental design of adsorption unit for LPG separation.

1.3 Scopes

1. Design and Construct the experimental apparatus.
2. Carry out test run and make modification on the experimental apparatus.
3. Measure the equilibrium adsorption isotherm, the overall adsorption rate of n-butane and to estimate the effective diffusivity of n-butane on zeolites.
4. Find the effects of temperature on the equilibrium adsorption isotherm and the overall adsorption rate of n-butane on zeolites.
5. Design the fundamental adsorption unit.