CHAPTER 1

INTRODUCTION

General.

Amino acids find their principle commercial applications in human food, animal feed additives and in the pharmaceutical field. They are also used as intermediates for the synthesis of special chemicals like hypo-caloric sweeteners, and pharmaceutical peptides. Most of the amino acids are produced in commercial quantities by microbial fermentation. The amino acids have to be separated from substrate and nutrients, from impurities introduced through feed and from by-products. Separation is usually followed by final purification, concentration and crystallization. These stages account for up to 50% of the production costs (Eyal and Bressler, 1993). Various separation methods are utilized such as ion exchange, recrystallization, chromatography, adsorption, filtration, evaporation, reverse osmosis, formation of derivates such as salts or esters which are easier to separate, etc.

The emulsion liquid membrane (ELM) process have been used for 25 years since first developed by Li in 1968. Although liquid membranes firstly have been applied for recovering metals from waste water. Recently the application of this technique to downstream processing of bio-products has become interesting also because of the possibility of avoiding severe feed pre treatment. Biochemical treated by liquid membrane processes are amino acid (Yoshikawa, et. al., 1989 ; Thein, Hatton and Wang, 1988 ; Itoh et. al., 1990a ; Teramoto et. al., 1991) organic acids (Boey, Garcia Del Carro and Pyle, 1987 ; Scholler, Chandhuri and Pyle, 1993 ; Reisinger and Marr, 1992), penicillin (Haro et. al.,1990) etc. The emulsion liquid membrane extraction process seem to be more advantageous than the ordinary liquid extraction process because of the following reasons:

1. Extraction and stripping can be done in one stage, therefore the product can be separated and concentrated at the same time.
2. Very high transfer rate.
3. The possibility of extraction from very dilute solution.
4. Low energy consumption and minimal downstream unit

operations.

Since emulsion liquid membrane extraction is a very effective extraction method and no one have applied the method to extract amino acid in Thailand before, It is worth to start using this technique to extract amino acid in Thailand.

Purposes of Research Study.

In this study, the extraction of 2 essential amino acids, L-phenylalanine and L-tryptophan, by emulsion liquid membrane from dilute solution was performed with the following objectives:

1. To determine the K_{ex} of phenylalanine and tryptophan from kinetic equilibrium studies.
2. To extract phenylalanine from dilute solution by emulsion liquid membrane extraction.
3. To extract tryptophan from dilute solution by emulsion liquid membrane extraction.
4. To extract the phenylalanine and tryptophan from dilute mixture solution by emulsion liquid membrane extraction.
5. To describe the mechanism of mass transfer of amino acid in the emulsion liquid membrane extraction.

Scope of the Study.

The emulsion liquid membrane extraction of phenylalanine and tryptophan were studied according to the following conditions:

1. The concentration of phenylalanine in the external or feed phase was 0.006 M.
2. The concentration of tryptophan in the external or feed phase were 0.001 M and 0.006 M.
3. The mixture solution of phenylalanine and tryptophan were 0.006 M Phe + 0.006 M Trp and 0.006 M Phe + 0.001 M Trp.
4. The pH of external phase solution were 2, 3 and 5.
5. The extraction temperature was 25 °C.
6. The other experimental conditions of emulsion liquid membrane extraction were as follows:

a) <u>External Phase or Feed Phase.</u>

350 ml of phenylalanine or tryptophan solution.

b) Membrane Phase.

25 ml of the following solution:

Solvent	: n-Dodecane	176 ml
Carrier	: D2EHPA	10 ml
Surfactant	: Span 80	4 ml
		190 ml

c) Internal Phase or Stripping Phase.

25 ml of 1.0 N HCl Solution.