

CHAPTER 1

INTRODUCTION



1.1 GENERAL

Nowadays herbs and natural products are widely used in the field of medicine, foods, drinks, and cosmetics (สมุนไพรรพพื้นบ้าน, 2537). Thailand has a large source of herbs that can be extracted to get alkaloids which constitute important components of modern medicinal herbs (เอมอร โรจนะพันธ์, นพมาศ สรรพคุณ, วิภา จิระจรรย์ยะกุล, และอ้อมบุญ ล้วนรัตน์, 2533) Herbs and natural products have less side effects and less toxicity than those of synthetic substances that have been in use as the model of chemical synthetic products.

Berberine is an alkaloid which is somewhat difficult to define because there is no clear-cut boundary between alkaloids and naturally occurring complex amines. Typical alkaloids are normally derived from herbs. A kind of herbs known in Thai as "Khamin Khruua" (ขมิ้นเครือ) which is classified in the family Menispermaceae and widely distributed in the tropical countries including Thailand. Khamin Khruua is a woody climber with yellow wood. There are many different species but they have been used in the same therapeutic purpose in indigenous medicine (Thorner, 1970).

Berberine has been in use in pharmaceutical utilization for a wide variety of diseases such as fever, colic, muscle pain, stomach pain and as an antibiotic, antidiarrhoea and antifungal (Bhakuni, 1984). It is also used in traditional medicine against illnesses affecting the digestive tract (e.g. gastric ulcers) and against infections (oriental sore, conjunctivitis) (Bhakuni and Jain, 1984).

It is well-known that the conventional way to extract crude alkaloids from herbs is solvent extraction process. To increase crude alkaloid concentration, we usually utilize an evaporator which is highly inconvenient in operation. Moreover the process is more time and energy consuming making production cost too high. Especially it is not suitable for heat sensitive materials. For these reasons, emulsion liquid membrane is proposed to develop the enhancement of crude alkaloid concentration from herbs.

The emulsion liquid membrane process has been known for 29 years since the development by N. Li in 1968. During that time, emulsion liquid membrane has focused on applications in the recovery of metal ions from waste water. Then this process has been demonstrated for a wide variety of separations and becomes more interesting in many field such as biochemistry (Thien and Hatton, 1998), biomedicine (Thien, Hatton, and Wang, 1986) and pharmacy (Tang, Ma, and Li, 1990), etc.

The emulsion liquid membrane process has more advantages than that of solvent extraction process for various reasons such as:

1. Extraction and stripping can be done in one stage, at the same time the product can be separated and concentrated.
2. The possibility of extracting from dilute solution can be achieved with very high rate of transfer.
3. This process needs low energy consumption and minimal downstream unit operation.

It is evident that from the above advantages, emulsion liquid membrane process is a very effective extracting method. So there is many reason to apply this method to extract berberine from Thai herbs.

1.2 Purposes of Research Study

In this research, the possibility of emulsion liquid membrane process application to extract berberine from Khamin Khrueta, Thai herbs which is classified in Menispermaceae was conducted. The objectives of the study are the following :

1. To study the distribution (partition) coefficients of synthetic berberine solution and crude berberine solution with three organic solvents; n-hexane, kerosene and paraffin,

2. To study the effect of variables of synthetic berberine extraction by emulsion liquid membrane; pH of initial external phase, concentrations of surfactant, concentrations of hydrochloric acid solution,

3. To study the effect of variables of crude berberine extraction by emulsion liquid membrane; pH of initial external phase and concentrations of hydrochloric acid solution,

4. To study the suitable conditions on emulsion liquid membrane extraction of synthetic berberine solution, and crude berberine solution, and

5. To describe the mechanism of mass transfer rate of berberine extraction on emulsion liquid membrane.

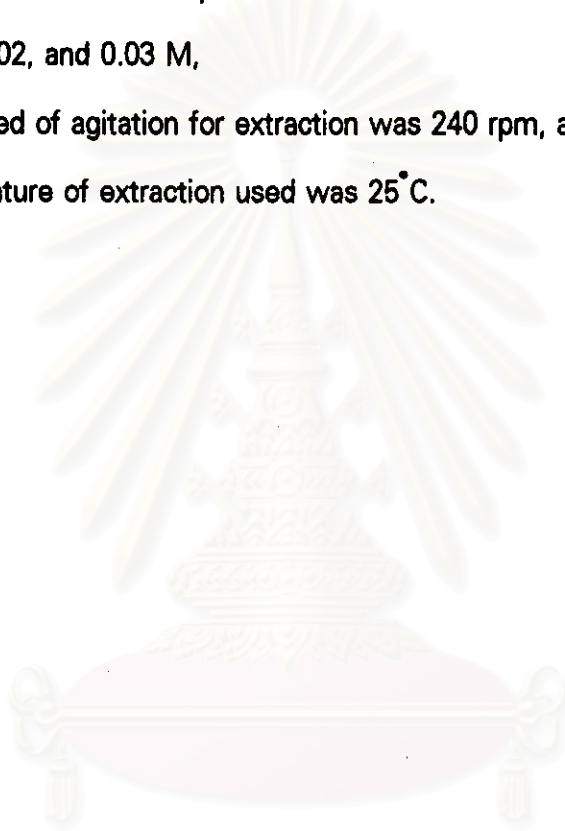
1.3 Scope of the Study

Berberine extraction by emulsion liquid membrane process covers the following scope :

1. The concentration of synthetic berberine in the external phase was 0.05 g/l,
2. The mother liquor of crude berberine from Khamin Khrueta which was used as external phase, was 0.11 g/l,
3. Different organic solvents were used to act as membrane phase to define

the distribution (partition) coefficient. The organic solvents are n-hexane, kerosene and paraffin,

4. Span-80 was used into membrane phase with concentrations of 1, 3, 5, and 7% (v/v) : (% volume of surfactant due to % volume of solvent),
5. The concentrations of hydrochloric acid solution in external phase were 0.1, 0.01, 0.02, and 0.03 M,
6. The speed of agitation for extraction was 240 rpm, and
7. Temperature of extraction used was 25°C.



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