Study on the Extraction, Separation and Purification Methods of Medical Components for Liquorice

Jian-Zhong Yin[*1], Wei Wei[1], Qin-Qin Xu[1], and Ai-Qin Wang[2]

1 School of Chemical Engineering, Dalian University of Technology, Dalian 116012, P.R.China
2 Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian 116023, P.R.China

Corresponding Author: Jian-Zhong Yin, aqjzyin@yahoo.com

Abstract: With the aim of extraction, separation and purification of medicine component from Liquorice, we performed extraction experiments of liquorice using various methods, including supercritical CO_2 extraction, room-temperature immersion and ultrasonic extraction. The optimum extraction conditions were found, and the extracted products were analyzed by GC-MS.
Keywords: Flavonoids; Glycyrrhizic Acid; SCFE; Purification; Chemical Analysis

INTRODUCTION

I - MATERIALS AND METHODS

Liquorice root materials were milled and sieved to appropriate particle size (0.2-0.4mm) before use. They contain about 3.0wt% water. The entrainer of alcohol was in the purity of 99.0%. The purity of carbon dioxide supplied by Guangming Gas Plant was better than 99.9%. The apparatus of SCFE was described in the literatures [1].

The influence of pressure to yield was shown in the figure1 under the temperature range from 45 to 60□. The effect of temperature to yield was shown in the figure 2 under the pressure from 7.5 to 15MPa.

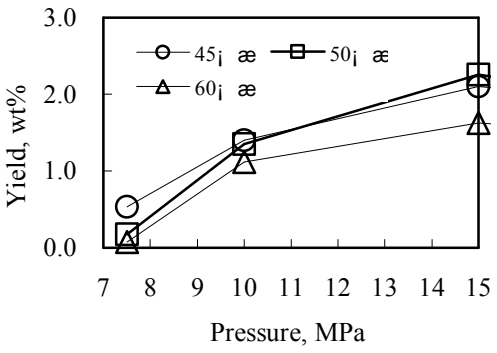

Figure 1 The influence of pressure to yields

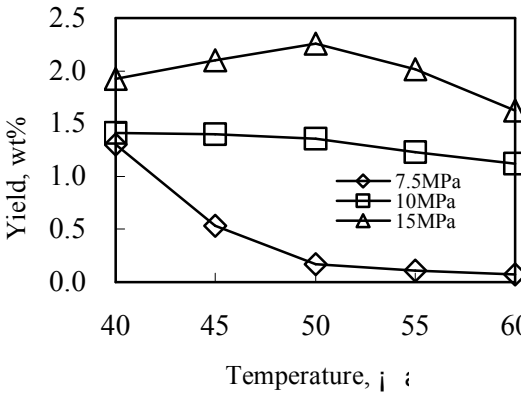

Figure 2 The influence of temperature to yields

CONCLUSION

The following results are obtained based on the experiments: Flavonoids were extracted from liquorice using supercritical CO_2 extraction. A variety of factors were investigated, including liquorice granularity, extraction pressure, temperature, extraction time and flow rate of CO_2. In addition, cosolvent type and its concentration and dosage were also examined. Based on the separate effect of these factors on the product yield, the optimal extraction conditions are determined. The product yield was 7.03% at 16MPa and 50□.

To obtain polar products from liquorice, we performed room-temperature immersion and ultrasonic extraction, and compared the three different extraction methods based on extraction efficiency and product distribution. The product yield was 7.72% and 8.92% with the ultrasonic extraction and the room-temperature immersion method, respectively. Besides, the product distribution was very different with the three different extraction methods. Following supercritical CO_2 extraction, the material was subjected to ultrasonic extraction and an extraction yield of 4.85% was obtained. The total extraction yield from a combination of the two extraction processes was 11.88%, with flavonoids as the major product in supercritical CO_2 extraction and Glycyrrhizic Acid in ultrasonic extraction.

The crude extracts were separated by the methods of TLC and Column Layer Chromatography. It was found that $SCCO_2$ extracts were composed of 7 group components, while ultrasonic extracts included 7 group components and room-temperature immersion extracts had 2 group components. The component identification of these groups were determined by MS. $SCCO_2$ extracts had a lot of flavonoids, glycycoumarin and Glycyrrhetinic Acid. But Glycyrrhizic Acid, with high molecular weight and strong polarity, was very difficult to be extracted by $SCCO_2$.

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