

**ULTRASONIC ASSISTED EXTRACTION OF GLYCYRRHIZIC  
ACID FROM LICORICE**Pranjali Sahane<sup>1</sup>, Manisha V. Bagal<sup>2</sup><sup>1,2</sup> Department of Chemical Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India

**Abstract** — The present work investigates the ultrasonic assisted extraction of glycyrrhizic acid (GA) from Licorice. The effect of sonication time, solid to solvent ratio on the yield of extraction has been investigated. It has been observed from the obtained results that maximum yield of 26 mg glycyrrhizic acid / g of Licorice is obtained in 60 min at 30 °C using 40:1 (water: Licorice) ratio. To compare the efficacy of extraction, experiments are also carried out using conventional batch extraction at already optimized parameters. It is observed that ultrasound assisted extraction results in higher yield and reduction in the extraction time as compared to conventional process. The current work has clearly established the advantage of ultrasound-assisted extraction compared to the conventional extraction processes.

**Keywords-** Ultrasonic, extraction, Licorice, glycyrrhizic acid, sonication time

**I.INTRODUCTION**

Licorice is one of the most widely used medicinal plants, both in Western and Eastern herbal medicine and has at least 3000 years of history as a medicinal plant. The plant contains various substances with different mechanisms of action. Glycyrrhizic acid found in licorice has an antispasmodic effect on the gastrointestinal tract, whereby the bacteria in the intestines is converted into a substance that acts as a liver-protective agent by neutralizing free radicals [1]. The several mechanical and chemical processes such as steam distillation [2], solvent extraction [3], high pressure process [4] are used for extraction of natural products. The disadvantages of mechanical processes are poor efficiencies and low yields, while that of chemical extraction methods includes harmful effects to environment due to the need of large quantity of organic solvents and long processing time. The recovery of active components from plants needs effective extraction process to reduce activity loss by maintaining high purity [5-7].

**II.MATERIAL AND METHODS**

Licorice powder was obtained from local market. Distilled water has been used as solvent Standard i.e., glycyrrhizic acid was purchased from Aldrich Chemical Company. Ultrasonic assisted extraction has been carried out using Ultrasonic bath procured from Dakshin India Ltd. Mumbai. The ultrasonic bath has an operating frequency of 20 kHz and rated power output of 120 W. A glass reactor of 200 ml capacity is kept inside the ultrasonic bath. To investigate the effect of solvent (water) to solid (Licorice) ratio experiments are carried out by varying solvent to solid ratio such as at 20:1,30:1,40:1 and 50: 1. The ultrasonic bath temperature is maintained at 40°C. Samples withdrawn at specific time interval, filtered to get clear extract which is then analyzed using UV Spectro photometer. The conventional batch extraction is carried out at already optimized solvent to solute ratio using a glass reactor which is stirred continuously.

**III.RESULT AND DISCUSSIONS****3.1. Effect of solvent to solute ratio on ultrasonic extraction**

In order to investigate the effect of solvent to solute ratio on ultrasound assisted extraction of GA from Licorice, experiments are carried out by varying water to licorice ratio such as 10:1, 20: 1,30: 1, 40: 1 and 50:1. The obtained results are depicted in Figure1. It has been observed from the obtained results that the maximum yield of 26 mg per 1 g of licorice was obtained at 40: 1 solvent to solid ratio.

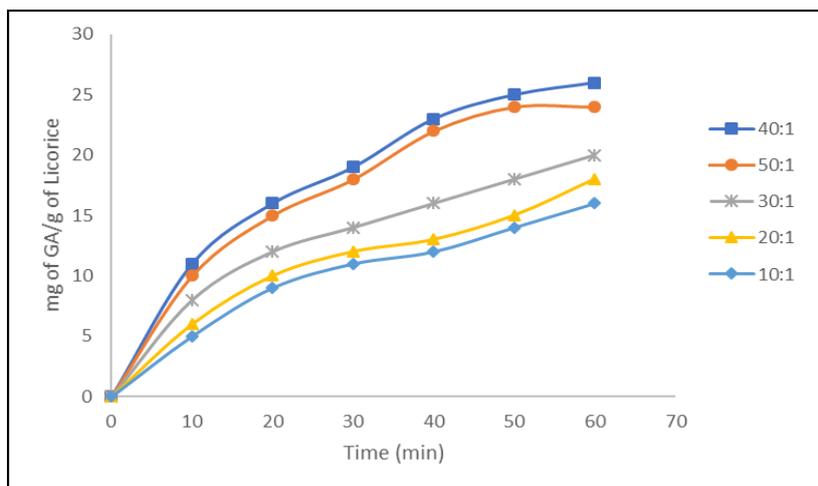


Figure 1. Effect of solvent to solute ratio on extraction of GA (temperature: 30°C).

### 3.2. Conventional batch extraction process.

In order to compare the efficiency of ultrasonic assisted extraction of GA from Licorice, experiments are also carried out using conventional batch extraction process at already optimized solvent to solute ratio of 40:1. The obtained results are depicted in Figure 2. It has been observed from the obtained results that 12 mg GA/ gm of licorice is obtained after 60 min of stirring in batch process. Thus, the yield of GA obtained from licorice using ultrasonic assisted extraction is higher as compared to that obtained from batch process. Also, the time required for ultrasonic extraction is less as compared to that of batch process.

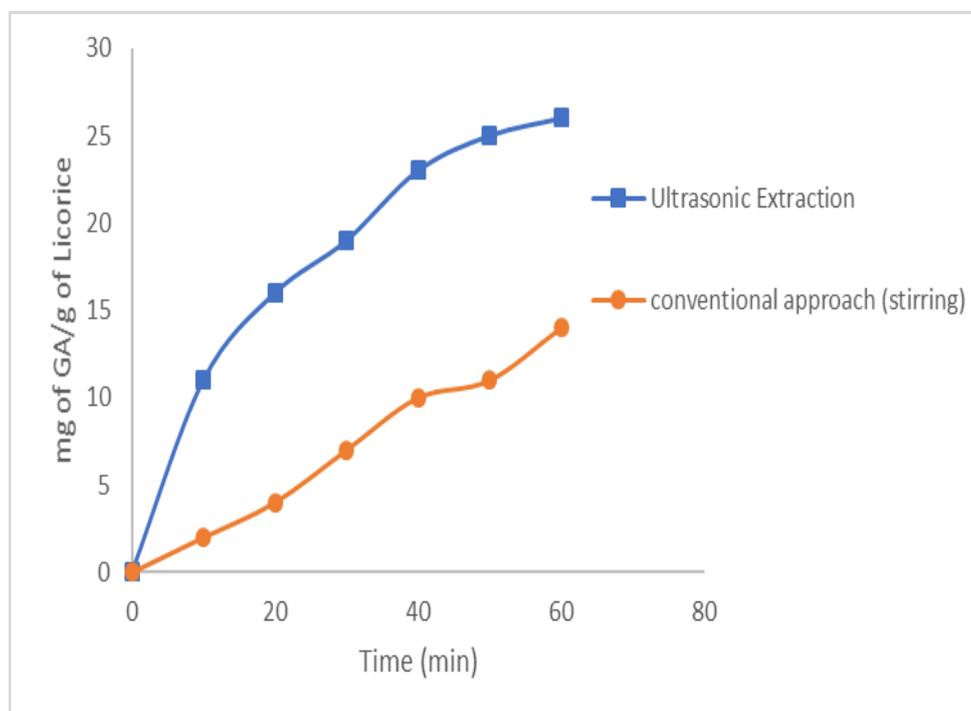


Figure 2: Comparison of ultrasonic extraction with conventional approach using stirring

## IV.CONCLUSION

Ultrasound assisted extraction of GA from Licorice has been investigated in the present work. The effect of different operating parameters such as Solvent to solute ratio and Extraction time on the extraction of GA has been studied. It has been observed from the obtained results that solvent to solute ratio of 40:1 at 30°C gives maximum extraction of GA (26 mg GA /g of Licorice) from Licorice. In order to compare the efficacy of Ultrasound assisted extraction process, the experiments are also carried out using conventional method of stirring. It has been observed from the obtained results that 12 mg GA/ g of licorice is obtained after 60 min of stirring in a batch process. It has been clearly established that the net yield of extractable GA from Licorice was enhanced by the sonication treatment as against conventional extraction.

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