

## ULTRASOUND ASSISTED METHODS FOR ENHANCED EXTRACTION OF PHENOLIC ACIDS FROM *QUERCUS INFECTORIA* GALLS

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### Abstract

*Quercus Infectoria* galls or known as Manjakani, is one of the potential herbs that have multiple therapeutic properties and are widely used in folklore medicine. Phenolic acids, including gallic acid and tannic acid, has been extracted from the galls by using different ultrasound extraction system (probe-type and bath-type) and the results was compared with the conventional extraction system. The effect of solvent types and solvent concentration on the extraction yield have been investigated. The maximum extraction yield obtained for gallic acid and tannic acid are 2155.77 mg/kg and 152368.25 mg/kg, respectively in 8 h extraction time, operating temperature of 60°C, solid to solvent ratio of 1:10, ultrasonic power of 11 W and ultrasound frequency of 20 kHz with 0.1 M hexadecyltrimethylammonium bromide as the solvent. The obtained yield was significantly higher as compared to the conventional extraction system where only about 794.57 mg/kg yield was achieved. Peleg's model was used to describe the kinetics of probe-type ultrasound extraction system and the model showed a good agreement with the experimental results. Therefore, it can be concluded that probe sonication system significantly induces the extraction efficiency to increase the bioactive constituents yield.

**Keywords:** Polyphenols; *Quercus Infectoria* galls; Hexadecyltrimethylammonium bromide; Conventional extraction; Ultrasonic-assisted extraction

**Area of research:** Extraction