



Investigation of water solubility of encapsulated rosemary essential oil in β -cyclodextrin

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Statement of Problem: *Salvia rosmarinus* (rosemary) is a fragrant evergreen flowering shrub which is belonged to the mint family. Rosemary essential oil (REO) is widely used in the pharmaceutical, traditional medicine, and food industries. Even though REO has many biological activities like anti-oxidant, anti-inflammatory, and anti-depressant, it is insoluble in water. Cyclodextrins (CDs) are chemical substances with natural resources. They have a cyclic truncated cone shape with a hydrophobic cavity and hydrophilic exterior. This distinguished structure allows the insertion of organic compounds into the cavity forming an inclusion complex to increase their water solubility.

Research Purpose: In this research, we tend to encapsulate REO with β -cyclodextrin to stabilize the REO and evaluate its water solubility.

Research Method: Briefly, 0.1 gr of β -CD was completely dissolved in a solvent mixture of water and ethanol (10ml, v/v= 4:1). Then, 0.5 ml of REO was added to the mixture and sonicated for 28 minutes at RT. Finally, the mixture was dried at RT. A UV-Vis spectrometer method is adopted to assess the water solubility of the product (REO / β -CD).

Results and Conclusion: the formation of the inclusion complex was approved by the presence of a band at 1649 cm^{-1} in the FT-IR spectrum. Also, some characteristic peaks of β -CD are shifted due to the formation of the product. The UV-Vis. spectroscopy exhibited an increase in the water solubility of REO / β -CD to 1.5%.

Our findings revealed the medical applications of REO will be increased and suited in aqueous media by preparing an encapsulate by β -CD due to the increasing water solubility.

Keywords: β -cyclodextrin; encapsulation; *Salvia rosmarinus*