

## عنوان مقاله:

Solubility prediction of celecoxib in carbitol-water mixtures using Jouyban-Acree Model

## محل انتشار:

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## خلاصه مقاله:

**Background and Objective:** Solubility is one of the most important thermodynamic properties in drug discovery, and a major parameter considered in pharmaceuticals in order to achieve suitable formulations for desired pharmacological response. By many estimates up to 70% of new chemical entities (NCEs) discovered by the pharmaceutical industry and many existing drugs are poorly soluble or are lipophilic compounds. According to the biopharmaceutics classification system (BCS), Celecoxib is a class 2 drug, possessing low water solubility ( $<5 \mu\text{g}\cdot\text{mL}^{-1}$ ) and high permeability. Increasing the solubility of this group can lead to improved bioavailability, dose reduction and subsequently, increased efficiency and reduced side effects. **Materials and Methods:** In this study, the solubility of celecoxib was determined in binary mixtures of {Carbitol + water} at temperature range of 293-313 K. The experimental solubility data of celecoxib in carbitol+water were correlated by two cosolvency models i.e. the Jouyban-Acree model and Jouyban-Acree-van't Hoff model. Furthermore, the apparent thermodynamic properties of dissolution process of celecoxib in all the mixed solvents were calculated according to van't Hoff and Gibbs equations. **Findings:** The solubility of Celecoxib is increased with addition of Carbitol to the aqueous solutions and reaches a maximum value in neat Carbitol. In addition, increased temperature leads to enhanced solubility in a given solvent composition. Calculating of the apparent thermodynamic properties show that the dissolution of celecoxib in these mixed solvents is an endothermic process. **Conclusion:** In this work, the solubility of celecoxib in binary mixtures of Carbitol and water mixtures at different temperatures was determined experimentally and mathematically correlated using two accurate mathematical models both from correlative and predictive capabilities viewpoints; i.e. Jouyban-Acree model, Jouyban-Acree-van't Hoff model. The generated data set extends available database of solubility of pharmaceuticals and are essential in the practical process for production and purification of celecoxib.

## کلمات کلیدی:

Solubility, Celecoxib, Binary solvent mixture, Jouyban-Acree model, van't Hoff equation

