

**UNIVERSITI TEKNOLOGI MARA**

**SOLUBILITY ENHANCEMENT  
MECHANISM OF LOVASTATIN  
USING ARGININE AS  
CO-SOLUTE**

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## ABSTRACT

Lovastatin (LVS) is one of the cholesterol lowering drugs categorised as Class II Biopharmaceutics Classification System (BCS). LVS exhibits low aqueous solubility and bioavailability thus presenting a great challenge to formulators. Though various studies have been conducted to enhance its solubility however, very few actually describe this phenomenon in terms of thermodynamics and solute-solvent interaction. Arginine (ARG), an amino acid, has been reported to enhance the solubility of wheat protein gluten that is extremely insoluble through hydrogen bonding and  $\pi$  electron-cation interaction. Hence, the purpose of this study was to explore the feasibility of ARG as a solubility enhancer for LVS. It also aimed to describe the solute-solvent and solute-cosolute interactions, as well as thermodynamics parameters that bolstered the solubility of LVS in the presence of ARG. The water solubility of LVS at different concentrations of ARG (0.01-0.8 mol dm<sup>-3</sup>) was determined. These solutions were subjected to conductometric, volumetric, viscometric, acoustic and refractometric measurements at temperatures (T) of 298.15, 303.15 and 308.15 K. Furthermore, ultraviolet-visible (UV) spectrophotometric data were collected to complement thermophysical findings. A significant solubility enhancement of LVS in the presence of ARG as a co-solute was observed. Thermodynamic parameters obtained suggested a high degree of solute-solvent interactions and formation of complexation of LVS and ARG which was confirmed by spectral results. Though strong solute-solute interactions were detected in the LVS-ARG system, however solute-solvent interactions dominated. Based on results of the maximum molecular interaction and polarizability of the LVS-ARG system, it could be concluded that solute-solvent interaction was associated with the water structure disruption followed by solvation.

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