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Solubility and solution thermodynamics of cetilistat in water and (acetone, isopropyl alcohol, acetonitrile) binary solvent mixtures

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Abstract: This study aimed to explore the solubility and solution thermodynamics of cetilistat. Data on solid–liquid equilibrium of cetilistat are essential for a preliminary study of industrial applications. The solubility of cetilistat in binary solvent mixtures consisting of (water+acetone), (water+isopropyl alcohol), and (water+acetonitrile) was measured in the temperature range of 278.15K–323.15K. The modified Apelblat equation, general cosolvency model and Jouyban-Acree model were used to correlate with the solubility of cetilistat. The modified Apelblat equation provided a more accurate mathematical representation of the experimental data by comparing the models. The thermodynamic properties of the solution process, including the Gibbs free energy, enthalpy, and entropy, were calculated by the van't Hoff analysis.

Keywords: Binary solvent mixtures, cetilistat, solubility, thermodynamic properties

1. Introduction

Obesity is a modern plague in industrialized and developing countries, Currently overweight and obesity cause more deaths worldwide compared with underweight. Cetilistat (2-hexadecyloxy-6-methyl-4H-3,1-benzoxazin-4-one)(Fig.1), is a drug designed to treat obesity. It acts in the same way as the older drug orlistat (Xenical) by inhibiting pancreatic lipase, an enzyme that breaks down triglycerides in the intestine. Without this enzyme, triglycerides from the diet are prevented from being hydrolyzed into absorbable free fatty acids and excreted undigested [1]. A published phase 2 trial found that cetilistat significantly reduced weight and was better tolerated compared with orlistat [2].

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