Supporting Information

Thermodynamic Solubility and Mixing Properties of Phenformin in Fourteen Pure Solvents at Temperatures Ranging from 278.15 K to 323.15 K

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Computational process of the relative standard uncertainty of the determinations in mole fraction

(1) Calculating the arithmetic mean value by the original data of measurement

$$\boldsymbol{\mu = \frac{1}{n}\sum_{i=1}^{n} x_i} \quad \text{(S1)}$$

here *n* is number of measurements.

(2) Calculating the standard deviation

The uncertainty of measurement results generally contains several components. These components can be divided into two classes: class A and class B. Class A, which is obtained by Eq. (S2), refers to the repeatedly measured results in statistical method to calculate the standard deviation.

$$u_A = \frac{\sqrt{\frac{\sum_{i=1}^{n}(x_i - \mu)^2}{n-1}}}{\sqrt{n}} \quad \text{(S2)}$$

Class B refers to the instrument error of estimation method to assess. When the measured values deviate to one direction with constant deviation due to error influence, then the uncertainty cannot be evaluated by using the statistical method. This kind of uncertainty is said to class B evaluated through Eq. (S3).

$$u_B = \frac{\Delta}{\sqrt{3}} \quad \text{(S3)}$$

where Δ stands for limit error or allowable error.

The liquid chromatographic measurement is performed to acquire the mole fraction of solute in equilibrium liquid phase. The UV standard curve is constructed before experiment. After sampling the liquid phase, the uncertainty is calculated with the calibration curve by using Eq. (S4).

$$u_{\mathrm{c}} = \sqrt{u_{\mathrm{A}}^2 + u_{\mathrm{B}}^2} \quad \text{(S4)}$$

(3) Calculating the relative standard deviation

The relative standard uncertainty is calculated with

$$u_x = \frac{u_{\mathrm{c}}}{\bar{x}} \quad \text{(S5)}$$