Supporting Information

Selective Binding of Methotrexate to Monomeric, Dimeric and Polymeric Cyclodextrins

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1. Determination of the stability constants of MTX/CD complexes from the capillary electrophoresis data.

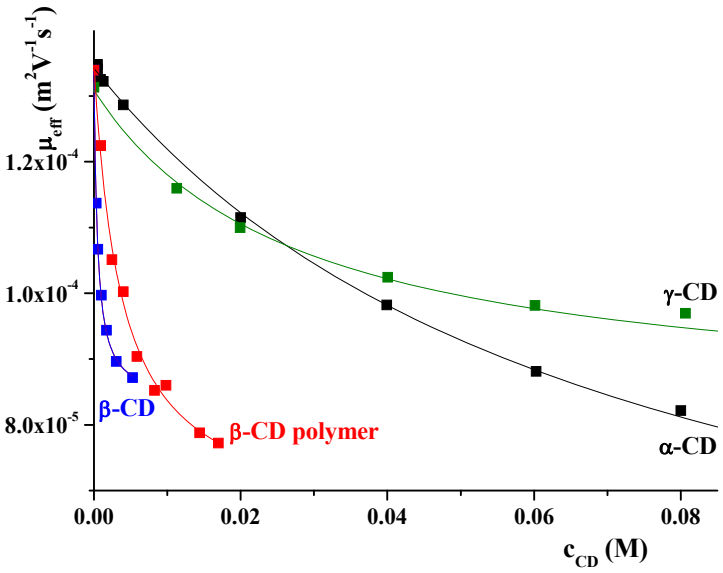

Figure 1SI. Dependence of viscosity-corrected effective mobility of MTX on CD concentration (pH 2.2, 298.15 K).

Dependences of the viscosity-corrected effective mobility of MTX on CD concentration were used for calculation of the stability constants of CD/MTX complexes. The 1:1 equilibrium of complex formation is described by the following equation:

$$CD + MTX = CD/MTX \qquad K = \frac{[CD/MTX]}{[CD]\cdot[MTX]} \qquad (1SI)$$

The effective MTX mobility is expressed as

$$\mu_{eff} = \alpha_{MTX} \cdot \mu_{MTX} + \alpha_{CD/MTX} \cdot \mu_{CD/MTX} \quad (2SI)$$

where α_{MTX} and $\alpha_{CD/MTX}$ are the fractions of free MTX and CD/MTX complexes, respectively; μ_{MTX} and $\mu_{CD/MTX}$ are the mobilities of free MTX and CD/MTX complexes, respectively. The total concentration of MTX (C_{MTX}) can be written as follows:

$$C_{MTX} = [MTX] + [CD/MTX] \quad (3SI)$$

where $[MTX]$ and $[CD/MTX]$ are the concentrations of free MTX and CD/MTX complexes, respectively.

The mathematical combination of Eqs. 1SI-3SI gives the equation for the observed MTX mobility:

$$\mu_{eff} = \frac{\mu_{MTX} + \mu_{CD/MTX} \cdot K \cdot [CD]}{1 + K \cdot [CD]} \quad (4SI)$$

The values of K were calculated according to equation (4SI) by non-linear least-squares regression analysis.

2. Determination of the thermodynamic parameters of complex formation.

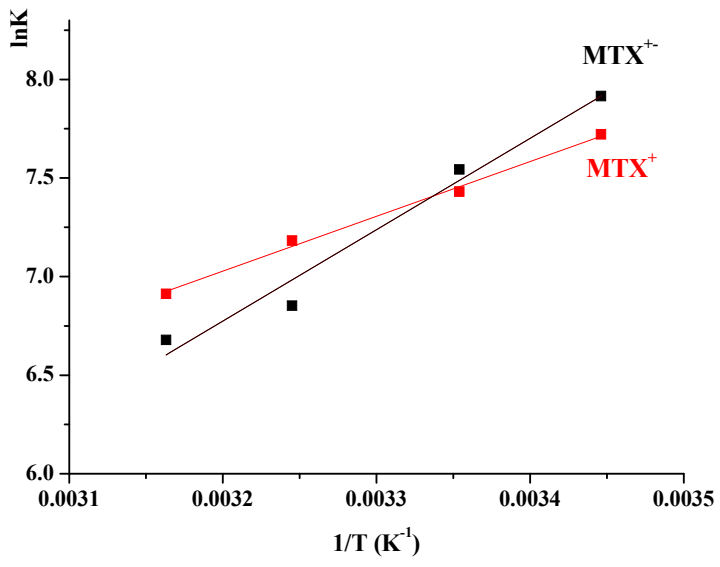

Figure 2SI. Van 't Hoff plots for complex formation of cationic (MTX^+) and zwitterionic ($MTX^{\pm}$) forms of MTX with β-CD in buffer pH 2.2.

Thermodynamic parameters of complex formation such as the enthalpy and entropy changes were calculated from the relationship according to the van't Hoff equation:

$$\ln K = -\frac{\Delta H}{RT} + \frac{\Delta S}{R} \qquad (5SI)$$

where ΔH and ΔS are the enthalpy and entropy of complex formation, respectively; T is the temperature; R is the gas constant. Values of ΔH and ΔS can be easily obtained from van 't Hoff plots.