

Characterization of the thermodynamic parameters of protein stability and interactions by DSC and ITC (differential scanning calorimetry and isothermal titration calorimetry)

Date: December 2014 (3.-5. / 10.-12. / 17.-19.)

Duration 2-3 Days

Number of participants: 2-4

With ITC it is possible to quantify the most crucial thermodynamic characteristics of protein interactions with small molecules or other proteins.

By measuring the generated or absorbed heat of a biomolecular reaction in series of mixing steps the association constant (K_A), the stoichiometry of the reaction (N) and reaction enthalpy (ΔH) is obtained and the change of entropy (ΔS) can be calculated. In addition, temperature dependent measurements yield the heat capacity change (ΔC_P).

With DSC the following parameters for unfolding of biomolecules can be analyzed: the heat capacity (C_P), the change in the heat capacity (ΔC_P), the calorimetric enthalpy (ΔH_{cal}), the van't Hoff enthalpy (ΔH_{VH}), the change of entropy (ΔS), and finally, the melting temperature (T_m).

On the first day the participants will be introduced to the theoretical and experimental concepts of ITC and DSC and they will get familiar with the instruments and the measuring procedure. This will be done by prepared "test"-reactions/systems.

On the second day the participants have the opportunity to do first measurements with their own protein samples, otherwise some additional "test"-measurements will be performed to demonstrate the potential of ITC and DSC for the analysis of protein interactions. The third day is planned for analysis of the data and trouble shooting.

The introduction to these methods will take two or three days.

1. Day: theoretical and experimental aspects of ITC and DSC, measurements of prepared examples

2.-3. Day: Measurements of individual prepared samples. Evaluation and interpretation of the results

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