

## How Do Non-Ionic and Ionic Contributions Influence the Thermophoresis of Protein-Ligand Systems?

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Thermophoretic behavior of a free protein changes upon ligand binding and gives access to information on the binding constants [1]. The Soret effect, the buildup of a concentration gradient in an applied temperature gradient, has been proven to be a promising tool to gain information on the change of the hydration layer, when a ligand binds to a protein. The scenario is complex, as these systems consist of hydrophobic, hydrophilic and ionic entities as chemical (side) groups of proteins, as ligands or as buffer components. In order to get a better understanding of the process we studied systematically the thermophoretic behavior of various non-ionic amides and salt solutions using thermal diffusion forced Rayleigh scattering (TDFRS). Additionally, we investigate systematically the protein streptavidin (STV) and of the complex STV with biotin (B) [2]. In case of the amides [3] and simple salt [4] solutions we investigate whether ionic and non-ionic contributions to the Soret coefficient can be separated, for which we performed systematic measurements in a wide temperature and concentration range. It turns out that the change of Soret coefficient with concentration and temperature for non-ionic and ionic solutes show different correlations with respect to the hydrophilicity of the systems. We also discuss how the mutual diffusion as well as the thermal diffusion of these systems are changed with concentration and finally, we elucidate the challenges arising from the quantitative thermophoretic study of complex multicomponent systems such as protein solutions.

### References

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