Hofmeister effect on thermo-responsive poly(propylene oxide): Role of polymer molecular weight and concentration - DTU Orbit (08/11/2017)

Hofmeister effect on thermo-responsive poly(propylene oxide): Role of polymer molecular weight and concentration
Although a vast amount of research has been dedicated to investigate the Hofmeister effect on the stability of polymer solutions, a clear understanding of the role of polymer properties in this phenomenon is still missing. Here, the Hofmeister effect of NaCl (destabilizing) and NaSCN (stabilizing) salts on aqueous solutions of poly(propylene oxide) (PPO) is studied. Four different molecular weights of PPO were investigated, to determine how the variation in the polymer coil size affects the Hofmeister effect. The investigation was further conducted for different PPO concentrations, in order to understand the effect of inter-chain interactions on the response to addition of salt. The temperature-driven phase separation of the solutions was monitored by differential scanning calorimetry, which provides the precise value of the phase separation temperature, as well as the enthalpy change accompanied with the transition. It was observed that increasing the molecular weight weakens the effect of the both salts, which is interpreted in terms of a scaling law between the molecular weight and the accessible surface area of the polymers. Increasing the PPO concentration further diminished the NaCl effect, but amplified the NaSCN effect. This difference is attributed to an electrostatic stabilization mechanism in the case of NaSCN.

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