PC 86

CRITICAL EXPONENTS OF THERMAL PHASE TRANSITIONS OF κ-CARRAGEENAN IN VARIOUS SALT SOLUTIONS

Ö. Tari[a], Ö. Pekcan[b]

[a]*Istanbul Technical University, Faculty of Science and Letters, Department of Physics, Maslak, 34469, Istanbul, Turkey (otari@itu.edu.tr)*
[b]*Isik University, Faculty of Science and Letters, Department of Physics, Kumbaba, Sile, 34980, Istanbul, Turkey (pekcan@isikun.edu.tr)*

Thermal phase transitions of kappa (κ-) carrageenan in NaCl, KCl and $CaCl_2$ solutions were studied using the steady state fluorescence (SSF) technique. Using this technique, it is possible to study different microenvironments in which the probe molecules are embedded. Pyranine (P) (a derivative of pyrene molecule) was used as a fluorescence probe for monitoring these transitions. Scattered light, I_{sc} and fluorescence intensity, I were monitored against temperature. It was observed that during coil-to-helix and helix-to-coil transitions of carrageenan molecules the pyranine intensity I, presented a continuous increase and decrease, respectively. Scattered light intensity, I_{sc} was monitored to detect the changes of turbidity during phase transition. The necessary correction on the pyranine intensity were made to produce the real transition curves to determine the critical coil-to-helix (T_{ch}) and helix-to-coil (T_{hc}) temperatures and exponents. It was observed that critical temperatures are strongly correlated to the NaCl, KCl and $CaCl_2$ contents and increased by increasing NaCl, KCl and $CaCl_2$ content. The weight average degree of polymerization, DP_w and gel fraction G exponents (γ and β) were measured and found to be in accord with the classical Flory-Stockmayer Model during the thermal phase transitions. It is important to note that all carrageenan systems independent of salt solutions are found to belong to the same universality class.