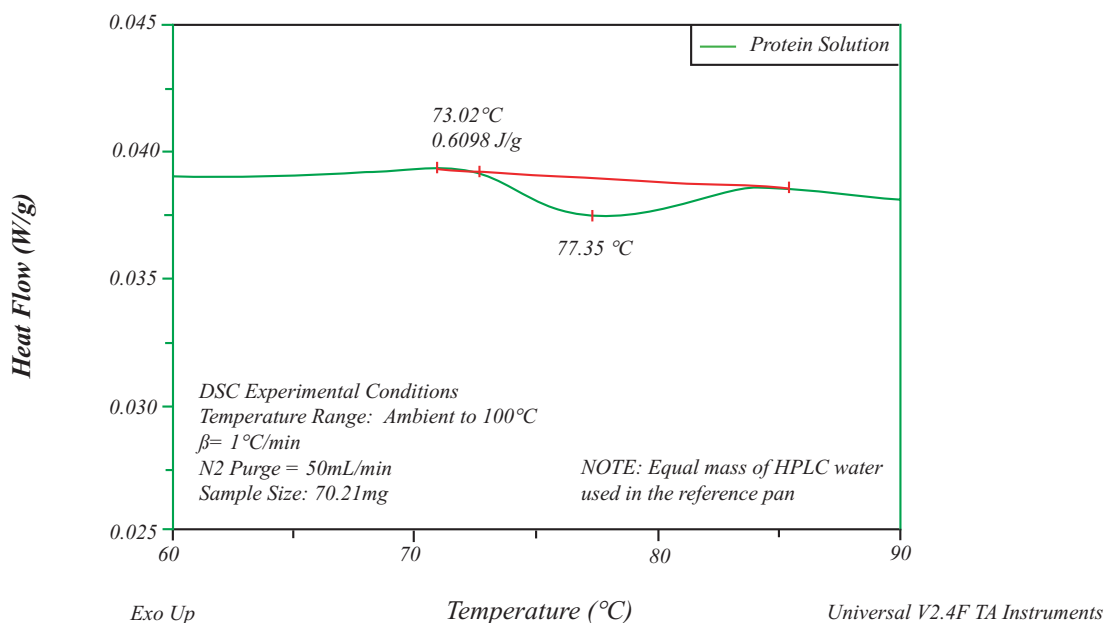




THERMAL SOLUTIONS

Characterization of Protein Denaturation by DSC using High Volume Sample Pans



DSC measures the temperatures and heat flows associated with transitions in materials as a function of temperature or time in a controlled atmosphere. This technique provides quantitative and qualitative information about physical and chemical changes that involve endothermic or exothermic processes, or changes in heat capacity.

DSC evaluation of dilute protein solutions can be difficult due to the low energy and broad temperature range of the denaturation transition. Because the concentration of protein in solution is typically very low, detecting low levels of heat flow requires a high sample volume and a hermetic seal to prevent evaporation of the solution.

The recent introduction of high volume pans for the DSC permits samples of up to 100 μL to be characterized. The above plot shows a protein denaturation transition of only 0.6098J/g with an onset temperature of 73.02°C. This sample was run from ambient up to 100°C at a heating rate of 1°C/min. An equal mass of HPLC water was used in the reference pan to more closely match the heat capacity of the reference and sample pans. This scan clearly shows how the high volume sample pans can be used to characterize dilute protein solutions exhibiting low energy transitions over a wide temperature range.