

Temperature effects on reaction rates

We know that the E_a for complex formation from a particular small-molecule to protein interaction is 4.3 kcal/mole. At room temperature (25°C), k_{on} for the interaction is 2.5×10^{-6} L/mol-s. If we want to slow down the rate of the reaction to 1.65×10^{-6} L/mol-s, at what temperature must this reaction take place?

Example ITC Problem

A particular ligand-protein interaction has $\Delta G = -8.18$ kcal/mole. You decide to run a typical ITC experiment to determine the other thermodynamic parameters associated with this interaction. You set up your experiment such that the initial volume of the cell is 1.5 mL, and the initial protein concentration in the cell is 60 μ M. The concentration of the ligand in the injection syringe is 1.2 mM, and 10 μ L of this ligand solution is injected every 400 seconds. Given that the experiment is carried out at 25°C, and the 4th injection generates 35.7 ucal of heat, calculate ΔH and ΔS . Take into consideration the changes in cell volume due to the ligand injections.