

Quiz : Statistical Thermodynamics: SCI205/405 - Spring 2020 : 27 Mar 2020

Time: 30 mins

Roll No. 2018113006 to 2018113010

Max. marks=25

Questions carry equal marks.

1. What is the Gibbs' principle of equal apriori probabilities? If the principle is correct, then why is a particular distribution overwhelmingly dominant?
2. Explain briefly how entropy is related to the degeneracy of a state with a certain energy..
3. Explain briefly (in words) why the ground rotational state of molecule is not the highest occupied.
4. Consider a short polypeptide with four amino acid residues, each labelled h or c for helix or coil respectively. Conformations $hhhh$ and $cchc$ contribute terms q_0 and q_3 , to the partition function q . How can we express an approximate value of $\frac{q_3}{q_0}$ and what is the basis for it? Explain briefly.
5. Calculate the molar energy, Helmholtz free energy and entropy of HCl gas at 1 atm, 37°C (given : $\frac{\hbar^2}{2Ik_B} = 15.2\text{K}$; $\frac{h\nu}{k_B} = 4140\text{K}$; $D_0 = 102.2\text{kcal.mol}^{-1}$. Assume ideal behaviour.