〈 全部為四題. 每題 25分. 〉

1. $\Delta G = \Delta H - T\Delta S$ is a equation of the second thermodynamics. please

   i) Define the meaning of G, H, S, respectively.

   ii) Describe the relationship between this equation and chemical reaction.

2. At what pH is the average net change on a lysine molecule Zero? That is, what is its isoelectric point?

   $pK_3 = 2.16 \ (-CO_2H)$

   $pK_2 = 9.18 \ (\alpha-NH_3^+)$

   $pK_1 = 10.79 \ (\varepsilon-NH_3^+)$

3. Biochemistry textbooks give $\Delta G^{\circ\prime} = -20.1 \ kJ \ mol^{-1}$ for the hydrolysis of ethyl acetate at pH 7 and 25°C. Experiments in acid solution show that

   $$\frac{[CH_3CH_2OH][CH_3CO_2H]}{[CH_3CO_2CH_2CH_3]} = 14$$

   where concentrations are in moles per liter. What is the value of $\Delta G^{\circ\prime}$ obtained from this equilibrium constant? The PK of acetic acid = 4.60 at 25°C

4. Describe the Mechanism of thranscription.