ISSUES OF PHYSICAL CHEMISTRY

2018-2019

LESSON 2

6. Determine under what conditions the following statements are true for a system:

   a) $\Delta G = 0$ in a reversible process
   b) $\Delta S = 0$ in a reversible process
   c) What is the sign of ΔG for a spontaneous process under the conditions of point **a)**?
   d) What is the sign of ΔS for a spontaneous process under the conditions of point **b)**?

7. If the temperature is used for determining the thermal equilibrium and pressure to determine the mechanical equilibrium, what magnitude is used to determine the chemical and phase equilibrium?. Define this property.

8. Indicate under what conditions the following equations can be applied:

   a) $dU = dQ + dW$
   b) $dU = TdS - PdV$
   c) $dU = TdS - PdV + \sum_{\alpha} \sum_{i} \mu_i^{\alpha} dn_i^{\alpha}$

9. Answer the following questions, justifying your reply and making use of the adequate equations:

   a) Is $G = A + PV$ valid for any process and system?
   b) Is it true that Gibbs free energy of 12 g of ice at $0\,^\circ$ C and 1 atm is less than Gibbs free energy of 12 g of liquid water at $0\,^\circ$ C and 1 atm?
   c) What is the chemical reaction that has led to the following condition of chemical equilibrium?:

$$\mu_A + 3\mu_B = 2\mu_C - \frac{1}{2}\mu_D$$