Class 11 Thermodynamics MCQs

1. A well stoppered thermos flask contains some ice cubes. This is an example of
   (a) Closed system (b) Open system
   (c) Isolated system (d) Non thermodynamics system

   Ans: (c)
   Solution: It is an isolated system

2. For the reaction $C(s) + O_2(g) \rightarrow CO_2(g)$
   (a) $\triangle H > \triangle U$ (b) $\triangle H < \triangle U$
   (c) $\triangle H = \triangle U$ (d) None of these

   Ans: (c)
   Solution:Here $\triangle ng\ RT = 0$, because reactant and product contain same number of gaseous molecules. So that $\triangle H = \triangle U + \triangle ng\ RT \Rightarrow \triangle H = \triangle U$

3. For an ideal gas, C_V and C_P are related as :
   (a) $C_V - C_P = R$ (b) $C_V + C_P = R$
   (c) $C_P - C_v = RT$ (d) $C_P - C_v = R$

   Ans: (d) $C_P - C_v = R$
   Solution: For an ideal gas, C_V and C_P are related as $C_P - C_v = R$

4. The least random state of the water system is:
   (a) ice (b) liquid water (c) steam (d) randomness is same

   Ans: (a)
   Solution: The least random state of the water system is ice.

5. Considering entropy(S) thermodynamic parameters the criteria for the spontaneity of any process is:
   (a) $\triangle S$ system + $\triangle S$ surroundings > 0
   (b) $\triangle S$ system - $\triangle S$ surroundings < 0
   (c) $\triangle S$ system > 0
   (d) $\triangle S$ surroundings > 0

   Ans: (a)
   Solution: The criteria for the spontaneity of any process is

△S system + △S surroundings > 0

6. The enthalpy change in a reaction does not depend upon
   (a) the state of reactions and products
   (b) the nature of the reactants and products
   (c) different intermediate steps in the reaction
   (d) initial and final enthalpy of the reaction

   Ans: (c)
   Solution: The enthalpy change is a state function so it doesn't depend on different intermediate steps in the reaction.

7. The correct relationship between free energy change in a reaction and the corresponding equilibrium constant K_C is
   (a) $-\triangle G = RT \ln K_C$ (b) $\triangle G^0 = RT \ln K_C$
   (c) $-\triangle G^0 = RT \ln K_C$ (d) $\triangle G = RT \ln K_C$

   Ans: (c)
   Solution : The relationship between free energy change in a reaction and the corresponding equilibrium constant K_C is $\triangle G^0 = - RT \ln K_C$ or $-\triangle G^0 = RT \ln K_C$

8. What is the entropy change (in $JK^{-1}\ mol^{-1}$) when 1 mole of ice is converted into water at 0℃? (The enthalpy change for the conversion of ice to liquid water is 6.0 kJ mol^{-1} at 0℃)
   (a) 20.13 (b) 2.013 (c) 2.198 (d) 21.98

   Ans: (d)
   Solution: The entropy change; $ds = dq_{rev}/T \Rightarrow ds = 6000J\ mol^{-1} / 273K$
   $\Rightarrow ds = 21.978JK^{-1}\ mol^{-1}$

9. If liquids A and B form an ideal solution
   (a) the entropy of mixing is zero
   (b) the free energy of mixing is zero
   (c) the free energy as well as the entropy of mixing are zero
   (d) the enthalpy of mixing is zero

   Ans: (d)
   Solution: If liquids A and B form an ideal solution the enthalpy of mixing is zero

10. When water is added to quick lime the reaction is
    (a) Explosive (b) endothermic (c) exothermic (d) photochemical

Ans: (c)

Solution: When water is added to quick lime the reaction is exothermic

$CaO + H_2O \rightarrow Ca(OH)_2 \quad \triangle H = -ve$