GOVERNMENT OF TAMILNADU **HIGHER SECONDARY FIRST YEAR** **CHEMISTRY**

Unit **7**

THERMODYNAMICS

Choose the best answer

1. The amount of heat exchanged with the surrounding at constant pressure is given by the quantity

    a) ΔE b) ΔH c) ΔS d) ΔG

2. All the naturally occurring processes proceed spontaneously in a direction which leads to

    a) decrease in entropy   b) increase in enthalpy

    c) increase in free energy   d) decrease in free energy

3. In an adiabatic process, which of the following is true ?

    a) $q = w$ b) $q = 0$ c) $\Delta E = q$ d) $P \Delta V = 0$

4. In a reversible process, the change in entropy of the universe is

    a) > 0 b) ≥ 0 c) < 0 d) $= 0$

5. In an adiabatic expansion of an ideal gas

    a) $w = - \Delta u$ b) $w = \Delta u + \Delta H$ c) $\Delta u = 0$ d) $w = 0$

6. The intensive property among the quantities below is

    a) mass   b) volume   c) enthalpy   d) $\dfrac{mass}{volume}$

7. An ideal gas expands from the volume of $1 \times 10^{-3} \, m^3$ to $1 \times 10^{-2} \, m^3$ at 300 K against a constant pressure at $1 \times 10^5 \, Nm^{-2}$. The work done is

    a) $- 900 \, J$ b) $900 \, kJ$ c) $270 \, kJ$ d) $- 900 \, kJ$

8. Heat of combustion is always

     a) positive   b) negative   c) zero   d) either positive or negative

9. The heat of formation of CO and CO2 are $- 26.4$ kCal and $- 94$ kCal, respectively. Heat of combustion of carbon monoxide will be

     a) $+ 26.4$ kcal   b) $- 67.6$ kcal   c) $- 120.6$ kcal   d) $+ 52.8$ kcal

10. C(diamond) $\rightarrow$ C(graphite), $\Delta H = -ve$, this indicates that

a) graphite is more stable than diamond   c) both are equally stable

b) graphite has more energy than diamond   d) stability cannot be predicted

11. The enthalpies of formation of Al_2O_3 and Cr_2O_3 are -1596 kJ and -1134 kJ, respectively.

ΔH for the reaction $2Al + Cr_2O_3 \rightarrow 2Cr + Al_2O_3$ is

a) -1365 kJ   b) 2730 kJ   c) -2730 kJ   d) -462 kJ

12. Which of the following is not a thermodynamic function ?

a) internal energy   b) enthalpy   c) entropy   d) frictional energy

13. If one mole of ammonia and one mole of hydrogen chloride are mixed in a closed container to form ammonium chloride gas, then

a) $\Delta H > \Delta U$ b) $\Delta H - \Delta U = 0$ c) $\Delta H + \Delta U = 0$ d) $\Delta H < \Delta U$

14. Change in internal energy, when 4 kJ of work is done on the system and 1 kJ of heat is given out by the system is

a) $+1$ kJ   b) -5 kJ   c) $+3$ kJ   d) -3 kJ

15. The work done by the liberated gas when 55.85 g of iron (molar mass 55.85 g mol^{-1}) reacts with hydrochloric acid in an open beaker at 25^0 C

a) -2.48 kJ   b) -2.22 kJ   c) $+2.22$ kJ   d) $+2.48$ kJ

16. The value of ΔH for cooling 2 moles of an ideal monatomic gas from 125^0 C to 25^0 C at constant pressure will be $\left[\text{given } C_P = \dfrac{5}{2} R \right]$

a) -250 R   b) -500 R   c) 500 R   d) $+250$ R

17. Given that $C(g) + O_2(g) \rightarrow CO_2(g)$ $\Delta H^0 = -a$ kJ; $2 CO(g) + O_2(g) \rightarrow 2CO_2(g)$ $\Delta H^0 = -b$ kJ; Calculate the ΔH^0 for the reaction $C(g) + \frac{1}{2}O_2(g) \rightarrow CO(g)$

a) $\dfrac{b+2a}{2}$ b) $2a - b$ c) $\dfrac{2a-b}{2}$ d) $\dfrac{b-2a}{2}$

18. When 15.68 litres of a gas mixture of methane and propane are fully combusted at 0^0 C and 1 atmosphere, 32 litres of oxygen at the same temperature and pressure are consumed. The amount of heat of released from this combustion in kJ is (ΔH_C (CH_4) = -890 kJ mol^{-1} and ΔH_C (C_3H_8) $= -2220$ kJ mol^{-1})

a) -889 kJ   b) -1390 kJ   c) -3180 kJ   d) -632.68 kJ

19. The bond dissociation energy of methane and ethane are 360 kJ mol^{-1} and 620 kJ mol^{-1} respectively. Then, the bond dissociation energy of C-C bond is

   a) 170 kJ mol^{-1} b) 50 kJ mol^{-1} c) 80 kJ mol^{-1} d) 220 kJ mol^{-1}

20. The correct thermodynamic conditions for the spontaneous reaction at all temperature is (NEET Phase - I)

   a) $\Delta H < 0$ and $\Delta S > 0$

   b) $\Delta H < 0$ and $\Delta S < 0$

   c) $\Delta H > 0$ and $\Delta S = 0$

   d) $\Delta H > 0$ and $\Delta S > 0$

21. The temperature of the system, decreases in an _____

   a) Isothermal expansion   b) Isothermal Compression   c) adiabatic expansion

   d) adiabatic compression

22. In an isothermal reversible compression of an ideal gas the sign of q, ΔS and w are respectively

   a) +, −, −   b) −, +, −   c) +, −, +   d) −, −, +

23. Molar heat of vapourisation of a liquid is 4.8 kJ mol^{-1}. If the entropy change is 16 J mol^{-1} K^{-1}, the boiling point of the liquid is

   a) 323 K   b) 27^0 C   c) 164 K   d) 0.3 K

24. ΔS is expected to be maximum for the reaction

   a) $Ca(S) + \frac{1}{2} O_2(g) \rightarrow CaO(S)$

   b) $C(S) + O_2(g) \rightarrow CO_2(g)$

   c) $N_2(g) + O_2(g) \rightarrow 2NO(g)$

   d) $CaCO_3(S) \rightarrow CaO(S) + CO_2(g)$

25. The values of ΔH and ΔS for a reaction are respectively 30 kJ mol^{-1} and 100 JK^{-1} mol^{-1}. Then the temperature above which the reaction will become spontaneous is

   a) 300 K   b) 30 K   c) 100 K   d) 20^0 C