

THERMODYNAMICS

Choose the best answer

- The amount of heat exchanged with the surrounding at constant pressure is given by the quantity
a) ΔE b) ΔH c) ΔS d) ΔG
- 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
- In an adiabatic process, which of the following is true ?
a) $q = w$ b) $q = 0$ c) $\Delta E = q$ d) $P \Delta V = 0$
- In a reversible process, the change in entropy of the universe is
a) > 0 b) ≥ 0 c) < 0 d) $= 0$
- In an adiabatic expansion of an ideal gas
a) $w = -\Delta u$ b) $w = \Delta u + \Delta H$ c) $\Delta u = 0$ d) $w = 0$
- The intensive property among the quantities below is
a) mass b) volume c) enthalpy d) $\frac{\text{mass}}{\text{volume}}$
- An ideal gas expands from the volume of $1 \times 10^{-3} \text{ m}^3$ to $1 \times 10^{-2} \text{ m}^3$ at 300 K against a constant pressure at $1 \times 10^5 \text{ Nm}^{-2}$. The work done is
a) -900 J b) 900 kJ c) 270 kJ d) -900 kJ
- Heat of combustion is always
a) positive b) negative c) zero d) either positive or negative
- 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) $+26.4 \text{ kcal}$ b) -67.6 kcal c) -120.6 kcal d) $+52.8 \text{ kcal}$
- $\text{C(diamond)} \rightarrow \text{C(graphite)}$, $\Delta H = -ve$, 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 $2\text{Al} + \text{Cr}_2\text{O}_3 \rightarrow 2\text{Cr} + \text{Al}_2\text{O}_3$ 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) $+1 \text{ kJ}$ b) -5 kJ c) $+3 \text{ kJ}$ 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°C
- a) -2.48 kJ b) -2.22 kJ c) $+2.22 \text{ kJ}$ d) $+2.48 \text{ kJ}$
16. The value of ΔH for cooling 2 moles of an ideal monatomic gas from 125°C to 25°C at constant pressure will be $\left[\text{given } C_p = \frac{5}{2} R \right]$
- a) $-250 R$ b) $-500 R$ c) $500 R$ d) $+250 R$
17. Given that $\text{C}(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) \Delta H^\circ = -a \text{ kJ}$; $2 \text{ CO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{ CO}_2(\text{g}) \Delta H^\circ = -b \text{ kJ}$; Calculate the ΔH° for the reaction $\text{C}(\text{g}) + \frac{1}{2} \text{ O}_2(\text{g}) \rightarrow \text{CO}(\text{g})$
- a) $\frac{b+2a}{2}$ b) $2a-b$ c) $\frac{2a-b}{2}$ d) $\frac{b-2a}{2}$
18. When 15.68 litres of a gas mixture of methane and propane are fully combusted at 0°C and 1 atmosphere , 32 litres of oxygen at the same temperature and pressure are consumed. The amount of heat released from this combustion in kJ is ($\Delta H_c(\text{CH}_4) = -890 \text{ kJ mol}^{-1}$ and $\Delta H_c(\text{C}_3\text{H}_8) = -2220 \text{ kJ mol}^{-1}$)
- 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 $16 \text{ J mol}^{-1} \text{ K}^{-1}$, the boiling point of the liquid is
- a) 323 K b) 27° C c) 164 K d) 0.3 K
24. ΔS is expected to be maximum for the reaction
- a) $\text{Ca(S)} + \frac{1}{2} \text{O}_2(\text{g}) \rightarrow \text{CaO(S)}$
b) $\text{C(S)} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$
c) $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO(g)}$
d) $\text{CaCO}_3(\text{S}) \rightarrow \text{CaO(S)} + \text{CO}_2(\text{g})$
25. The values of ΔH and ΔS for a reaction are respectively 30 kJ mol^{-1} and $100 \text{ JK}^{-1} \text{ mol}^{-1}$. Then the temperature above which the reaction will become spontaneous is
- a) 300 K b) 30 K c) 100 K d) 20° C