

Thermodynamics

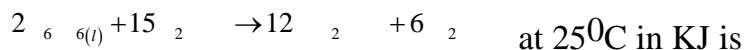
1. **Hot Milk in a thermos flask is an example for**
 1) Isolated system 2) Open system 3) Closed system 4) Adiabatic system
2. **In open system, system and surroundings exchange**
 1) Energy only 2) Matter only 3) Both 1 & 2 4) Neither 1 nor 2
3. **Which of the following is a state function?**
 1) Intrinsic energy 2) Enthalpy 3) Heat 4) Both 1 & 2
4. **The standard heat of combustion of graphite carbon is $-393.5 \text{ KJ mol}^{-1}$. The standard enthalpy of CO_2 is**
 1) $+393.5 \text{ KJ mol}^{-1}$ 2) $-393.5 \text{ KJ mol}^{-1}$ 3) $+196.75 \text{ KJ mol}^{-1}$ 4) $-196.75 \text{ KJ mol}^{-1}$
5. **Which of the following is a path function?**
 1) Internal energy 2) Enthalpy 3) Work 4) Entropy
6. **Mathematical representation of 1st law of Thermodynamics is**
 1) $Q = E + W$ 2) $H = E + PV$ 3) $W = Q \times E$ 4) $\Delta H = \Delta E + v\Delta P$
7. **Which of the following values of heat of formation indicates that the product is least stable?**
 1) -393.5 KJ 2) -972.7 KJ 3) $+89.9 \text{ KJ}$ 4) $+272.2 \text{ KJ}$
Hint: Endothermic compound is less stable. More endothermic is least stable.
8. **Enthalpy change in a cyclic process is**
 1) Infinite 2) Can't be predicted 3) Unity 4) Zero
9. **According to 1st law of Thermodynamics**
 1) Energy can be created but not destroyed
 2) Energy cannot be created but can be destroyed
 3) Energy can be created and destroyed
 4) Energy neither be created nor destroyed
10. **Internal energy does not include**
 1) Vibrational energy 2) Rotational Energy
 3) Energy due to gravitational pull 4) Potential Energy

11. At a given temperature internal energy of 4.4gm dry ice is
- 1) Same as 4.4gm liquid CO₂
 - 2) Same as 4.4gm CO₂ gas
 - 3) Same as 8.8gm dry ice
 - 4) Same as 0.1 moles of dry ice
12. The change in internal energy of a system depends on
- 1) Initial and final states of the system
 - 2) The Path if reversible
 - 3) The path if irreversible
 - 4) Initial, final states and also on the path
13. Enthalpy change during a reaction does not depend upon
- 1) Conditions of a reaction
 - 2) Initial and final concentration
 - 3) Physical states of reactants and products
 - 4) Number of steps in the reaction
14. The standard enthalpies of n-pentane, isopentane and neopentane are -35.0, -37.0 and -40.0 K.cal/mole respectively. The most stable isomer of pentane in terms of energy is
- 1) n-pentane
 - 2) Isopentane
 - 3) Neopentane
 - 4) Both 1 & 2
15. The enthalpies of the elements in their standard states are arbitrarily assumed to be
- 1) Zero at 298 K and 1 atm
 - 2) Unity at 298 K and 1 atm
 - 3) Zero at all temperatures
 - 4) Zero at 273 K and 1 atm
16. The standard enthalpy is zero for the substance
- 1) C (graphite)
 - 2) C (diamond)
 - 3) CO₂ (gas)
 - 4) All
17. The heat required to raise the temperature of a body by 1⁰C is called
- 1) Specific heat
 - 2) Heat capacity
 - 3) Water equivalent
 - 4) Heat energy
18. In exothermic reaction
- 1) H_R = H_P
 - 2) H_R > H_P
 - 3) H_R < H_P
 - 4) ΔH = 0
19. The incorrect IUPAC convention
- 1) Heat gained by system +ve sign
 - 2) Work done by system - ve sign
 - 3) Work done on the system +ve sign
 - 4) Work done on the system -ve sign
20. Which of the following is an endothermic reaction?
- 1) C + O₂ → CO₂
 - 2) N₂ + O₂ → NO
 - 3) 3H₂ + N₂ → 2NH₃
 - 4) PCl₃ + Cl₂ → PCl₅

21 change in enthalpy and change in internal energy are equal at room temperature for

- 1) Combustion of glucose 2) Combustion of ethylene
3) Combustion of methane 4) Combustion of ethyl alcohol

22. The difference between heats of reaction at constant pressure and at constant volume for the reaction



- 1) -7.43 2) +3.72 3) -3.72 4) +7.43

Hint: $\Delta H = \Delta E + \Delta n RT$

$$\Delta H - \Delta E = (-3) \times 8.314 \times 10^{-3} \times 298 = -7.43 \text{ KJ}$$

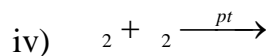
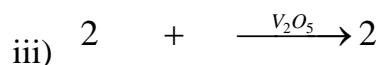
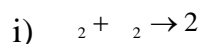
23. For which of the following reactions $\Delta H = \Delta E - 2RT$

- 1) $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightarrow 2\text{NH}_{3(g)}$ 2) $\text{N}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{NO}_{(g)}$
3) $\text{NH}_4\text{HS}_{(s)} \rightarrow \text{NH}_3_{(g)} + \text{H}_2\text{S}_{(g)}$ 4) $\text{PCl}_{5(g)} \rightarrow \text{PCl}_{3(g)} + \text{Cl}_{2(g)}$

Hint: $\Delta H = \Delta E + \Delta n RT$

Given $\Delta H = \Delta E - 2RT$ i.e. $\Delta n = -2$

24. For which of these process is the value of Δn negative



1. i and ii are correct 2. ii and iii are correct
3. iii and iv are correct 4. i and iv are correct

25. Heat of neutralization is least when

- 1) NaOH is neutralised by CH_3COOH 2) NaOH is neutralised by HCl
3) NH_4OH is neutralised by CH_3COOH 4) NH_4OH is neutralised by HNO_3

26. For the reaction $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$, the difference between enthalpy change and internal energy change is

- 1) $-RT$ 2) $+RT$ 3) $-2RT$ 4) Zero

Hint: $\Delta H = \Delta E + \Delta n RT$

27. The following is not a combustion reaction

- 1) $CO + \frac{1}{2}O_2 \rightarrow CO_2$ 2) $C + O_2 \rightarrow CO_2$ 3) $C + \frac{1}{2}O_2 \rightarrow CO$ 4) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

28. Match the following.

List-I

List-II

- | | |
|-------------------------|---|
| A) | 1) First law of thermodynamics |
| B) | 2) Heat of combustion |
| C) Bomb-calorimeter | 3) Relationship between Q_p and Q_v |
| D) Hess law is based on | 4) Exothermic reaction |

Correct match

A	B	C	D
1. 1	2	3	4
2. 4	3	2	1
3. 4	3	1	2
4. 3	1	4	2

29. $2(g) + 2(g) \rightarrow \Delta^0 = -$

- i) If the equation is reversed, the value ΔH^0 equal to $+92.3Kj$
 ii) The four H-Cl bonds are stronger than the four bonds in $2H_2$ and $2Cl_2$
 iii) The ΔH^0 value will be $-92.3Kj$ if the HCl is produced as a liquid
1. All are correct 2. i Only correct 3. i and ii are correct 4. iii Only correct

30. The correct statement among the following

- i) Heat of reaction depends on the temperature at which the reaction is carried
 ii) ΔH for neutralization is always $-Ve$.
 iii) Experimentally heat of combustion is ΔE .

31. Match the following.

List-I

List - II

A) solid \rightarrow vapour

1) 32.8

B) $H_2 + Cl_2 \rightarrow 2HCl$

2) -22

$\Delta H = -44$ K.cals

heat of formation HCl (k.cal)

C) Heat of combustion of

3) 1 calories

Graphite is-393.5 k.J its

Calorific value of (in k.J)

D) 4.184 Joules is equal to

4) Endothermic

Correct match is

	A	B	C	D
1.	1	2	3	4
2.	4	3	2	1
3.	4	2	1	3
4.	2	1	4	3

32. Match the following.

A) $HNO_3 + KOH$ i) 55.2 kJ per mol

B) $CH_3COOH + KOH$ ii) Path function

C) Internal Energy iii) 57.3 kJ per mol

D) Work done iv) State function

1) A-(iii), B-(i), C(iv), D(ii)

2) A-(i), B-(ii), C(iii), D(iv)

3) A-(ii), B-(i), C(ii), D(iv)

