1. Which one of the following is an exothermic reaction?

(A) $N_2(g) + O_2(g) + 180.8$ kJ $\longrightarrow 2NO(g)$

(B) $N_2(g) + 3H_2(g) - 90$ kJ $\longrightarrow 2NH_3(g)$

(C) $C(g) + H_2O(g) \longrightarrow CO(g) + H_2(g) - 131.1$ kJ

(D) $C(graphite) + 2S(s) \longrightarrow CS_2(l) - 91.9$ kJ

2. Which of the following taking place in the blast furnace is endothermic?

(A) $CaCO_3 \longrightarrow CaO + CO_2$ **(B)** $2C + O_2 \longrightarrow 2CO$

(C) $C + O_2 \longrightarrow CO_2$ **(D)** $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

3. Which one of the following is not a state function?

(A) Enthalpy   **(B)** Entropy   **(C)** Work   **(D)** Free energy

4. Which is an extensive property?

(A) Temperature   **(B)** Molar heat capacity

(C) Gibb's free energy   **(D)** Molar volume

5. Which of the following is a path function?

(A) Internal energy   **(B)** Enthalpy

(C) Work   **(D)** Entropy

6. For the following two reactions,

I. $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O$; $\Delta H = -890.4$ kJ

II. $2HgO(s) \longrightarrow 2Hg(l) + O_2(g)$; $\Delta H = -181.6$ kJ

Which one of the following statements is correct?

(A) Both of them are exothermic

(B) Both of them are endothermic

(C) I is exothermic and II is endothermic

(D) I is endothermic and II is exothermic

7. Which is correct for an endothermic reaction?

(A) ΔH is positive   **(B)** ΔH is negative
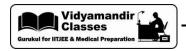
(C) ΔE is negative   **(D)** $\Delta H = 0$

8. $C(s) + O_2(g) \longrightarrow CO_2(g); \Delta H = -94$ kcal

$2CO(g) + O_2 \longrightarrow 2CO_2(g); \Delta H = -135.2$ kcal

The heat of formation of CO (g) is :

(A) -26.4 kcal   **(B)** 41.2 kcal   **(C)** 26.4 kcal   **(D)** 229.2 kcal

9. Internal energy is sum of :

(A) Kinetic energy or potential energy   (B) All type of energy of the system

(C) Energy of internal system   (D) None of the above

10. If $C(s) + O_2(g) \rightarrow CO_2(g); \Delta H = r$ and $CO(g) + \dfrac{1}{2}O_2 \longrightarrow CO_2(g); \Delta H = s$ then the heat of formation of CO is:

(A) $r + s$ (B) $r - s$ (C) $s - r$ (D) rs

11. Hess's law is based on :

(A) Law of conservation of mass   (B) Law of conservation of energy

(C) First law of thermodynamics   (D) None of the above

12. The first law of thermodynamics is expressed as :

(A) $q - W = \Delta E$ (B) $\Delta E = W - q$ (C) $q = \Delta E - W$ (D) $W = q + \Delta E$

13. Hess's law states that :

(A) The standard enthalpy of an overall reaction is the sum of the enthalpy changes in individual reactions

(B) Enthalpy of formation of a compound is same as enthalpy of decomposition of the compound into constituent elements, but with opposite sign

(C) At constant temperature the pressure of a gas is inversely proportional to its volume

(D) The mass of a gas dissolved per litre of a solvent is proportional to the pressure of the gas in equilibrium with the solution

14. The species which by definition has zero standard molar enthalpy of formation at 298 K is :

(A) Br_2 (g)   (B) Cl_2 (g)   (C) H_2O (g)   (D) CH_4 (g)

15. The amount of the heat released when 20 mL 0.5 M NaOH is mixed with 100 mL 0.1 M HCl is x kJ ? The heat of neutralization is:

(A) $-100\,x$ kJ / mol   (B) $-50\,x$ kJ / mol

(C) $+100x$ kJ/mol   (D) $+50x$ kJ/mol