Date Planned : __ / __ / __	Daily Tutorial Sheet-5	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level-1	Exact Duration :_____

61. The heat of combustion of sucrose ($C_{12}H_{22}O_{11}$) is 1350 kcal/mol. How much of heat will be liberated when 161 g of sucrose is burnt ?

(A) 26.8 kcal **(B)** 57.63 kcal

(C) 635.5 kcal **(D)** 52.87 kcal

62. Consider the following reactions.

I. $C(\text{graphite}) + O_2(g) \longrightarrow CO_2(g);\ \Delta H^\circ = -x_1$ cal

II. $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g);\ \Delta H^\circ = -x_2$ cal

Based on the above data, $\Delta H_f^\circ(CO_2)$ is :

(A) $-x_1$ cal **(B)** $-x_2$ cal

(C) $(x_2 - x_1)$cal **(D)** $(x_1 - x_2)$cal

63. From Q.(62) above, $\Delta H_f^\circ(CO)$ is:

(A) $-x_1$ **(B)** $-x_2$ **(C)** $x_2 - x_1$ **(D)** $x_1 - x_2$

64. Consider the following reactions,

I. $N_2 + O_2 \longrightarrow 2NO,\quad \Delta H = x_1$ **II.** $2CO + O_2 \longrightarrow 2CO_2,\quad \Delta H = x_2$

III. $2H_2O + O_2 \longrightarrow 2H_2O_2,\ \Delta H = x_3$ **IV.** $PCl_3 + Cl_2 \longrightarrow PCl_5,\quad \Delta H = x_4$

In which case(s), $\Delta H_f = \frac{\Delta H}{2}$?

(A) I, II, III **(B)** IV **(C)** II, III **(D)** I

65. Heat of reaction $A(s) + B(g) \longrightarrow 2C(g)$ is 40 kJ at 300 K and constant volume. Hence, heat of reaction at constant pressure and at 300 K is,

(A) 42.5 kJ **(B)** 37.5 kJ

(C) 40.0 kJ **(D)** 30.0 kJ

66. Heat of combustion of CH_4, C_2H_6 and C_3H_6 are respectively –210, – 368.4 and – 526.3 kcal mol^{-1}. Hence, heat of combustion of C_6H_{14} is approximately.

(A) –1310 kcal mol^{-1} **(B)** –684 kcal mol^{-1}

(C) –840 kcal mol^{-1} **(D)** –1000 kcal mol^{-1}

67. Calorific value of H_2 is –143 kJ g^{-1}. Hence, ΔH_f° of H_2O is:

(A) –143 kJ mol^{-1} **(B)** –286 kJ mol^{-1}

(C) +143 kJ mol^{-1} **(D)** +286 kJ mol^{-1}

68. Consider the following reactions,

I. $C(s) + \frac{1}{2}O_2(g) \longrightarrow CO(g), \quad \Delta H_1 = x_1$

II. $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g), \quad \Delta H_2 = x_2$

III. $C(s) + CO_2(g) \longrightarrow 2CO(g), \quad \Delta H_3 = x_3$

Select the correct statements:

(A) Heat of formation of CO_2 is $(x_1 + x_2)$ **(B)** Heat of combustion of C is $(x_1 + x_2)$

(C) $\Delta H_3 = \Delta H_1 - \Delta H_2$ **(D)** All of the above are correct statement(s)

69. The dissolution of $CaCl_2 \cdot 6H_2O$ in large volume of water is endothermic to the extent of 3.5 kcal mol^{-1}.

For the reaction $CaCl_2(s) + 6H_2O(l) \longrightarrow CaCl_2 \cdot 6H_2O(s) \quad \Delta H = -23.2$ kcal

Hence, heat of solution of $CaCl_2$ (anhydrous) in a large volume of water is:

(A) 26.7 kcal **(B)** –26.7 kcal

(C) 19.7 kcal **(D)** –19.7 kcal

70. Lattice energy of NaCl(s) is 788 kJ mol^{-1} and enthalpy of hydration is –784 kJ mol^{-1}. Hence, heat of solution of NaCl(s) is:

(A) 4 kJ mol^{-1} **(B)** –4 kJ mol^{-1}

(C) –1572 kJ mol^{-1} **(D)** 1572 kJ mol^{-1}

71. Bond energies of $N \equiv N$ bond, H – H bond and N – H bond are respectively x_1, x_2 and x_3 kJ mol^{-1}. Hence, $\Delta H_f^\circ(NH_3)$ is:

(A) $x_1 + 3x_2 - x_3$ **(B)** $x_1 + x_2 - x_3$

(C) $\frac{x_1}{2} + \frac{3}{2}x_2 - 3x_3$ **(D)** $x_1 + 3x_2 - 6x_3$

72. $H_2(g) + \frac{1}{2}O_2(g) \longrightarrow H_2O(l)$; $BE(H-H) = x_1$; $BE(O=O) = x_2$; $BE(O-H) = x_3$

Latent heat of vaporization of liquid water into water vapour = x_4 then ΔH_f (heat of formation of liquid water) is:

(A) $x_1 + \frac{x_2}{2} - x_3 + x_4$ **(B)** $2x_3 - x_1 - \frac{x_2}{2} - x_4$

(C) $x_1 + \frac{x_2}{2} - 2x_3 - x_4$ **(D)** $x_1 + \frac{x_2}{2} - 2x_3 + x_4$

73. Which combination of the following equations have enthalpy changes equal to $\Delta H_{comb}(C)$?

I. $C + O_2 \longrightarrow CO_2$ **II.** $C + \frac{1}{2}O_2 \longrightarrow CO$ **III.** $CO + \frac{1}{2}O_2 \longrightarrow CO_2$

(A) I, II **(B)** I, II, III

(C) I, III **(D)** I

74. The heat of atomisation of $PH_3(g)$ and $P_2H_4(g)$ are $953\,kJ\,mol^{-1}$ and 1485 kJ mol^{-1} respectively. The P – P bond energy in kJ mol^{-1} is:

(A) 213 **(B)** 426

(C) 318 **(D)** 1272

75. An imaginary lattice Cl^+Cl^- is formed as given

$$Cl_2 \longrightarrow 2Cl \qquad \Delta H = x_1\,, \qquad Cl \longrightarrow Cl^+ + e^- \qquad \Delta H = x_2$$

$$Cl + e^- \longrightarrow Cl^- \qquad \Delta H = x_3\,, \qquad Cl^+ + Cl^- \longrightarrow Cl^+Cl^- \qquad \Delta H = x_4$$

Thus, enthalpy change when Cl^+Cl^- is formed is:

(A) $\left(+\frac{x_1}{2} + x_2 + x_3 + x_4\right)$ **(B)** $\left(-\frac{x_1}{2} + x_2 + x_3 + x_4\right)$

(C) $(x_1 + x_2 - x_3 - x_4)$ **(D)** $-(x_1 + x_2 + x_3 + x_4)$