



# Sri Chaitanya IIT Academy, India

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A right Choice for the Real Aspirant

ICON CENTRAL OFFICE, MADHAPUR-HYD

Sec: Sr. IPLCO

Time: 9:00 AM to 12:00 Noon

RPTM-15

Date: 19-12-15

Max.Marks: 360

## KEY SHEET

PHYSICS		MATHS		CHEMISTRY	
Q.NO	ANSWER	Q.NO	ANSWER	Q.NO	ANSWER
1	4	31	4	61	2
2	3	32	3	62	3
3	3	33	1	63	1
4	1	34	1	64	3
5	3	35	3	65	1
6	3	36	4	66	2
7	1	37	3	67	3
8	1	38	2	68	2
9	2	39	2	69	1
10	1	40	1	70	4
11	2	41	2	71	4
12	3	42	2	72	2
13	4	43	1	73	3
14	4	44	3	74	3
15	4	45	3	75	3
16	2	46	3	76	2
17	2	47	4	77	1
18	2	48	1	78	3
19	1	49	4	79	1
20	1	50	2	80	2
21	1	51	4	81	2
22	2	52	4	82	4
23	2	53	2	83	4
24	1	54	1	84	4
25	1	55	2	85	3
26	1	56	2	86	2
27	1	57	2	87	3
28	3	58	1	88	2
29	3	59	3	89	1
30	2	60	1	90	1

**CHEMISTRY**

61. Key: 2

$$\Delta S_{Total}^0 = \Delta S_{Sys}^0 + \Delta S_{Surr}^0$$

$$= +3.78 \text{ kJ K}^{-1} \text{ mol}^{-1}$$

$$\Delta G^0 = -T \Delta S_{Total}^0$$

$$= -298 \times 3.78 = -1126.4 \text{ kJ K}^{-1} \text{ mol}^{-1}$$

62. Key: 3

$$\Delta G^0 = \Delta H^0 - T \Delta S^0 \text{ and } \Delta G^0 \text{ must be negative}$$

63. Key: 1

**Thermodynamics**

$$\Delta_r H^0 = \Delta_f H^0(\text{H}_2\text{PO}_4^-) + \Delta_f H^0(\text{H}^+) - \Delta_f H^0(\text{H}_3\text{PO}_4) = -1302 + 0 - (-1290) = -12 \text{ kJ mol}^{-1}$$

$$\Delta_r S^0 = S^0(\text{H}_2\text{PO}_4^-) + S^0(\text{H}^+) - S^0(\text{H}_3\text{PO}_4) = 89 + 0 - 176 = -87 \text{ JK}^{-1} \text{ mol}^{-1}$$

$$\Delta_r G^0 = \Delta_r H^0 - T \Delta_r S^0 = -12000 + 298 \times 87 = 13926 \text{ J}$$

$$2.303 RT \text{p}K_{a1} = 13926 \Rightarrow \text{p}K_{a1} = 2.44$$

64. Key: 3

65. Key: 1

66. Key: 2

$$\frac{dE}{dT} = \frac{\Delta H - \Delta G}{nFT} \quad \Delta G = -nFE$$

67. Key: 3

68. Key: 2

69. Key: 1

70. Key: 4

71. Key: 4

72. Key: 2

73. Key: 3

$$PV^\gamma = \text{constant}$$

$$P_1 V_1^\gamma = P_2 V_2^\gamma$$

$$\frac{P_1}{P_2} = \left( \frac{V_2}{V_1} \right)^\gamma \quad \Rightarrow \quad \frac{V_2}{V_1} \cdot \frac{T_1}{T_2} = \left( \frac{V_2}{V_1} \right)^\gamma$$

$$\log \frac{P_1}{P_2} = \gamma \log \frac{V_2}{V_1} \quad \Rightarrow \quad \frac{T_1}{T_2} = \left( \frac{V_2}{V_1} \right)^{\gamma-1}$$

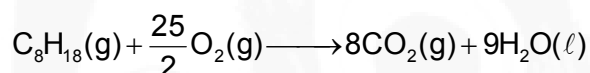
$$\gamma = \frac{\log P_1 - \log P_2}{\log V_2 - \log V_1} \quad \gamma - 1 = \frac{\log T_1 - \log T_2}{\log V_2 - \log V_1}$$

$$\gamma = \frac{(\log V_2 - \log V_1) + (\log T_1 - \log T_2)}{\log V_2 - \log V_1}$$

74. Key: 3

$$\Delta S = n C_p \ln \frac{T_2}{T_1} + n R \ln \frac{P_1}{P_2}$$

75. Key: 3



$$\Delta_r H^\circ = 8 \times (-394) + 9 \times (-286) - (-250) = -5476 \text{ KJ/mole}$$

76. Key: 2

77. Key: 1

78. Key: 3

79. Key: 1

80. Key: 2

81. Key: 2

82. Key: 4

83. Key: 4

84. Key: 4

85. Key: 3

86. Key: 2

87. Key: 3

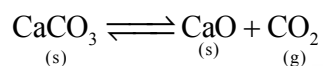
$$\frac{d(\Delta H)}{dT} = \Delta C_p; \quad \Delta C_p = -C_{p(\text{reactant})} + C_{p(\text{products})}$$

$$\therefore \int_{\Delta H_1}^{\Delta H_2} d(\Delta H) = \Delta C_p \int_{T_1}^{T_2} dT.$$

88. Key: 2

89. Key: 1

90. Key: 1



$$k_p = p_{\text{CO}_2}$$

$$\therefore k_p = p_{\text{CO}_2} = 500 \text{ torr at } 900\text{K}$$

$$k'_p = p_{\text{CO}_2} = 2000 \text{ torr at } 1000\text{K}$$

$$\therefore \ln \frac{k_p}{k_{p'}} = -\frac{\Delta H}{R} \left( \frac{1}{T} - \frac{1}{T'} \right)$$

$$\Rightarrow \ln \frac{500}{2000} = -\frac{\Delta H}{R} \left( \frac{1}{900} - \frac{1}{1000} \right)$$

$$\Rightarrow \ln \frac{1}{4} = -\frac{\Delta H}{R} \left( \frac{1}{9000} \right)$$

$$\Rightarrow \Delta H = 9000 \times R \times \ln 4.$$