JEE MAIN-2017

CHEMISTRY

61. **Sol. (1)**

$M_2CO_3 + 2HCl \rightarrow CO_2 + 2MCl + H_2O$

Moles of M_2CO_3 = Moles of CO_2 produced.

$$\text{moles of } M_2CO_3 = \frac{w}{\text{molar mass}} = 0.01186$$

$\therefore$ Molar mass $= 84.3 \text{ g mol}^{-1}$

So, option (1) is correct.

62. **Sol. (2)**

$$C_{(\text{graphite})} + O_2(g) \rightarrow CO_2(g); \quad \Delta_r H^o = -393.5 \text{ kJ/mol}^{-1} \quad \ldots(1)$$

$$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(\ell); \quad \Delta_r H^o = -285.8 \text{ kJ/mol}^{-1} \quad \ldots(2)$$

$$CO_2(g) + 2H_2O(\ell) \rightarrow CH_4(g) + 2O_2(g); \quad \Delta H_r^o = +890.3 \text{ kJ/mol}^{-1} \quad \ldots(3)$$

$$C_{(\text{graphite})} + 2H_2(g) \rightarrow CH_4(g); \quad \Delta H = ? \quad \ldots(4)$$

$$[Eq.(1) + Eq.(3)] + [2 \times Eq.(2)] = Eq.(4)$$

$$\therefore [\Delta H_1 + \Delta H_3] + [2 \times \Delta H_2] = \Delta H_4$$

$$[(-393.5) + (890.3)] + [2(-285.8)] = -74.8 \text{ kJ/mol}$$

$$= -74.8 \text{ kJ/mol}^{-1}$$

63. **Sol. (3)**

$\Delta T_f = i \times K_f \times m$

$\Rightarrow 0.45 = i \times 5.12 \times \frac{0.2 \times 1000}{60 \times 20}$

$i = 0.527$

$2CH_3COOH \rightleftharpoons (CH_3COOH)_2$

$1-\alpha \quad \frac{\alpha}{2}$

$i = 1 - \alpha + \frac{\alpha}{2}$

$\alpha = 0.946$

$\therefore$ % dissociation is 94.6%.

64. **Sol. (2)**

Total hydrogen $\left({}_1H^1\right) = \frac{10}{100} \times 75 = 7.5\,kg$

If it is replaced by ${}_1H^2$ then mass will be doubled so now hydrogen mass $= 15\,kg$ So, mass of person will be increased by $7.5\,kg$.

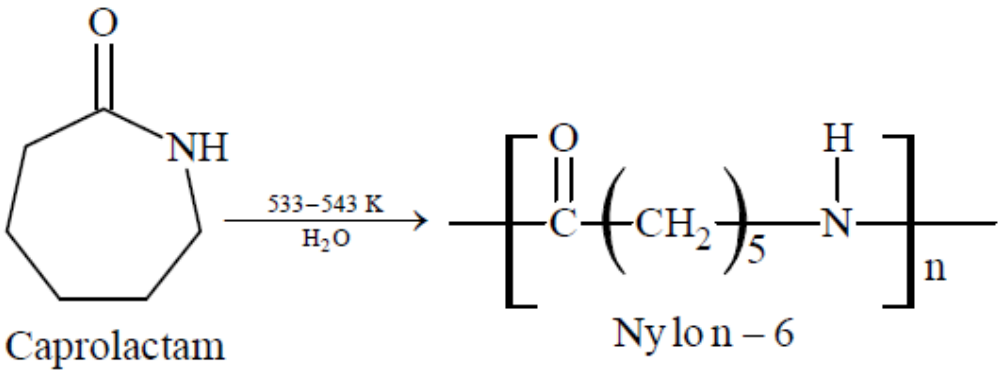
65. **Sol. (2)**

$\Delta U = q + w$

$q = 0$ in adiabatic process.

So, $\Delta U = w$

66. **Sol. (4)**



Caprolactam

Nylon – 6

67. **Sol. (4)**

Reduction potential of

$E^{o}_{Cr^{3+}/Cr} = -0.74\,V$

So, $E_{Cr/Cr^{3+}} = +0.74\,V$

$\therefore$ Cr would be strongest reducing agent.

68. **Sol. (1)**

Tyndall effect is observed only when

(i) The diameter of the dispersed particle is not much smaller than the wavelength of the light used.

(ii) The refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.

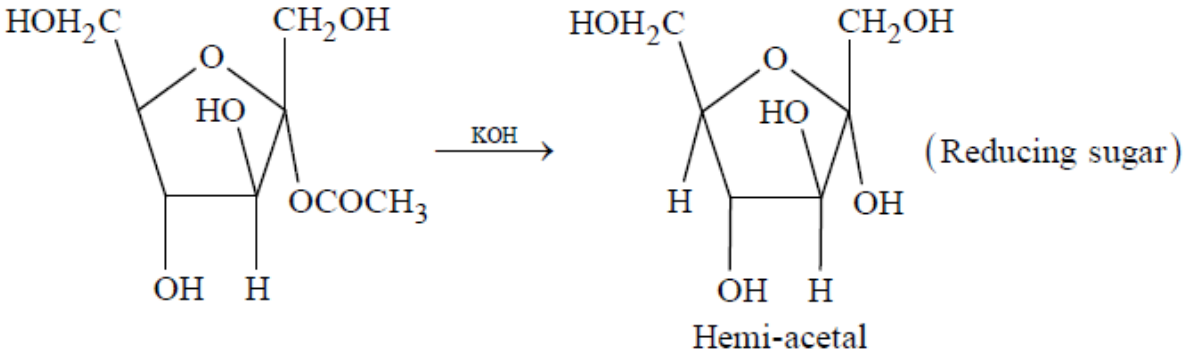
So, (b) and (d) are correct.

69. **Sol. (3)**

$ZnO + Na_2O \rightarrow Na_2ZnO_2$; ZnO behaving as an acid.

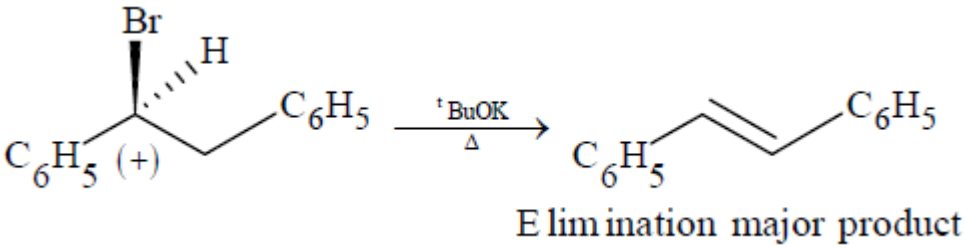
$ZnO + CO_2 \rightarrow NnCO_3$; ZnO behaving as a base.

70. **Sol. (4)**



Hemi-acetal

71. **Sol. (1)**



Elimination major product

72. **Sol. (1)**

(14) CO – diamagnetic
(16) O_2 – paramagnetic
(10) B_2 – paramagnetic
(15) NO – paramagnetic

73. **Sol. (4)**

Moles of $CoCl_3.6H_2O \rightarrow 100\,mL \times 0.1M = 10 \times 10^{-3}$

Ions $\rightarrow 6.023 \times 10^{21} \times 0.01$

Precipitated ions $= 1.2 \times 10^{22}$

$\therefore 1Ag^{+}$ ion and $1Cl^{-}$ ion .

So $\left[Co(H_2O)_5\,Cl_2\right]Cl.H_2O$ is correct.

74. **Sol. (1)**

$$pH = 7 + \frac{pH_a}{2} - \frac{pH_b}{2}$$
$$= 7 + \frac{3.2}{2} - \frac{3.4}{2}$$
$$= 6.9$$

75. **Sol. (1)**

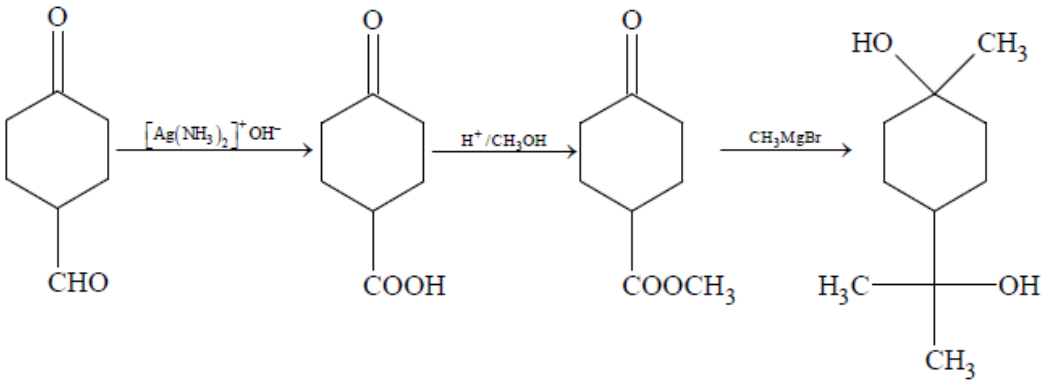
Rate of $S_N1\propto$ carbocation stability

$CH_3\overset{\oplus}{C}HCH_2CH_3$ (I) $CH_3CH_2\overset{\oplus}{C}H_2$ (II) p—CH_3O—C_6H_5—$\overset{\oplus}{C}H_2$ (III)

$\therefore$ II < I < III

76. **Sol. (1)**

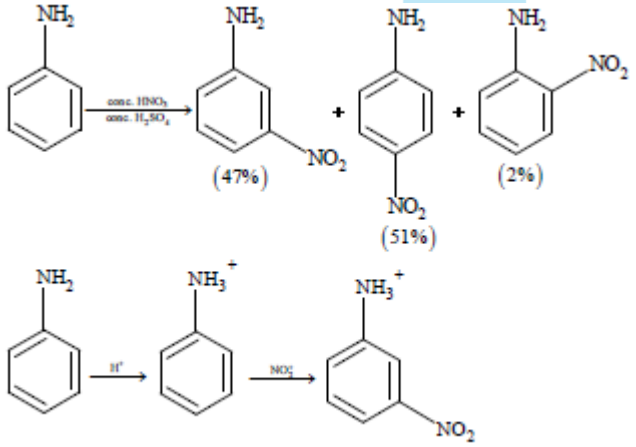
77. **Sol. (4)**



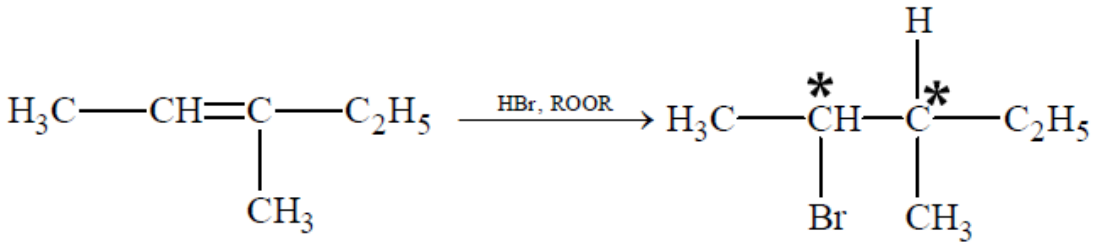
78. **Sol. (2)**

$$Cl_2 + \underset{(\text{cold \& dilute})}{2NaOH} \rightarrow NaCl + NaOCl + H_2O$$

79. **Sol. (2)**



80. **Sol. (3)**



Stereoisomers $= 2^n = 2^2 = 4$

81. **Sol. (3)**

$$k_1 = Ae^{-E_{a_1}/RT}$$

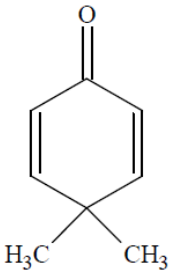
$$k_2 = Ae^{-E_{a_2}/RT}$$

$$\frac{k_2}{k_1} = e^{-\frac{\left(E_{a_2}-E_{a_1}\right)}{RT}}$$

$$\frac{k_2}{k_1} = e^{+\frac{10\times10^3}{8.314\times300}}$$

$$\ln\frac{k_2}{k_1} = 4$$

82. **Sol. (3)**

Except 

, all are aromatic in nature, so it has least resonance energy.

83. **Sol. (4)**

O^{2-}, F^-, Na^+ and Mg^{2+}, all have 10 electrons each.

84. **Sol. (3)**

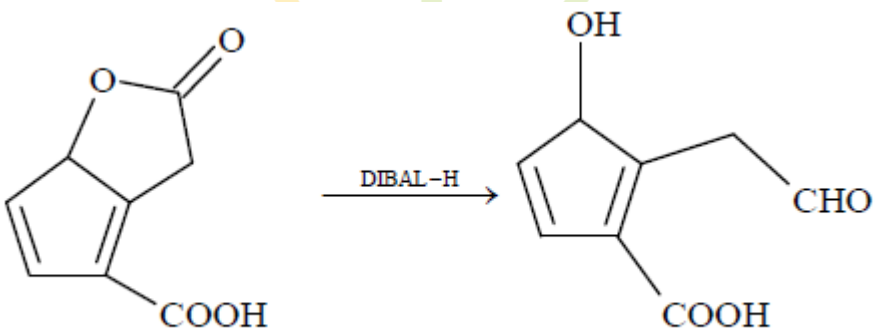
$$r_n = \frac{0.53n^2}{Z}\,\text{Å}$$

$$n = 2$$

$$Z = 1$$

$$r_2 = 0.53 \times 4\,\text{Å} = 2.12\,\text{Å}$$

85. **Sol. (4)**



86. **Sol. (4)**

$$\overset{+4}{\text{X}}\text{eF}_4 + \overset{+1}{\text{O}}_2\text{F}_2 \rightarrow \overset{+6}{\text{X}}\text{eF}_6 + \overset{0}{\text{O}}_2$$

Xenon oxidises and oxygen gets reduced.

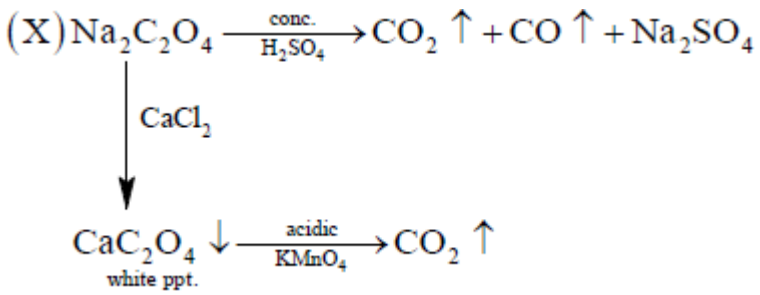
87. **Sol. (3)**

In *FCC* structure

$4r = \sqrt{2}a$

$2r = \dfrac{a}{\sqrt{2}} =$ closest approach between two atoms.

88. **Sol. (3)**



89. **Sol. (2)**

Permissible limit for $SO_4^{2-} = 500\,\text{ppm}$

Permissible limit for $NO_3^- = 50\,\text{ppm}$

Permissible limit for $F^- = 1\text{ppm}$

90. **Sol. (4)**