JEE MAIN - 2008

CHEMISTRY

47. Sol. (B)

Ag dissociates in a solution of NaCN in the presence of air, and forms sodium argentocyanide.

$$4Ag + 8NaCN + 2H_2O + O_2 \rightarrow 4Na\left[Ag(CN)_2\right] + 4NaOH$$

48. Sol. (D)

$$\underset{}{BOH} + \underset{}{HCl} \rightarrow \underset{C}{BCl} + \underset{}{H_2O}$$

$$\underset{C(1-h)}{B^+} + \underset{}{H_2O} \rightleftharpoons \underset{Ch}{BOH} + \underset{Ch}{H^+}$$

$$\text{Volume of HCl used} = \frac{2.5\times\frac{2}{5}}{2/15} = 7.5\text{ml}$$

$$\text{Concentration of Salt, } C = \frac{2.5\times\frac{2}{5}}{10} = 0.1\text{M}$$

$$\therefore \frac{Ch^2}{1-h} = \frac{K_w}{K_b}$$

Solving $h = 0.27$

$$\left[H^+\right] = Ch = 0.1\times 0.27 = 2.7\times 10^{-2}\text{M}$$

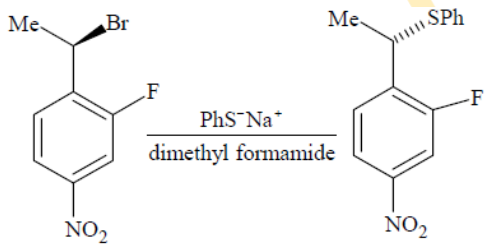
49. Sol. (A)

$$k_1 = \frac{0.693}{t_{1/2}} = \frac{0.693}{40}$$

$$k_0 = \frac{A_0}{2t_{1/2}} = \frac{1.386}{2 \times 20}$$

$$\frac{k_1}{k_0} = \frac{0.693}{40} \times \frac{40}{1.386} = \frac{0.693}{1.386} = 0.5 mol^{-1} litre$$

50. Sol. (A)



It is easier to do nucleophilic substitution on alkyl halides than on aryl halides.

51. Sol. (B)

Hyperconjugation involves overlap of $\sigma - p$ orbitals.

52. Sol. (B)

$$Na_2S_2O_3 + 4Cl_2 + 5H_2O \rightarrow 2NaHSO_4 + 8HCl$$

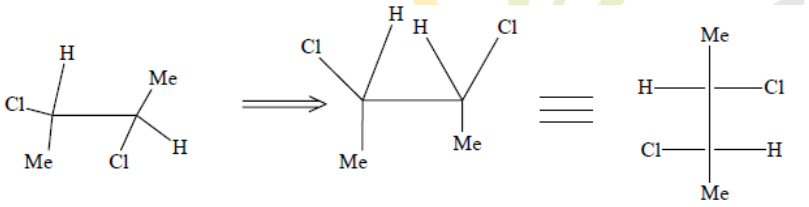
53. Sol. (A, C, D)

$$\left(P+\frac{n^2a}{V^2}\right)(V-nb)=nRT$$

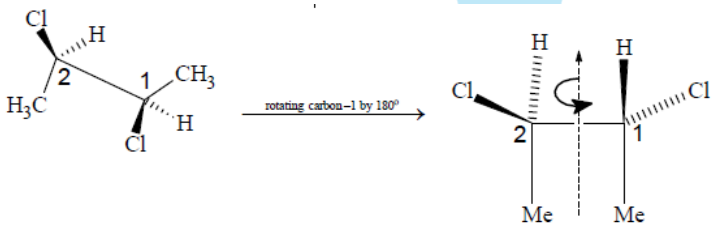
At low pressure, when the sample occupies a large volume, the molecules are so far apart for most of the time that the intermolecular forces play no significant role, and the gas behaves virtually perfectly.

a and b are characteristic of a gas and are independent of temperature. The term $\left(P+\frac{n^2a}{V^2}\right)$ represents the pressure exerted by an ideal gas while P represents the pressure exerted by a real gas.

54. Sol. (A, D)



The molecule is optically active.



The molecule possesses an axis of symmetry (C_2) perpendicular to the $C-C$ bond.

55. Sol. (B), (C), (D)

56. Sol. (A, B)

$$NH_4NO_3 + NaOH \rightarrow NH_3 + NaNO_3 + H_2O$$

$$7NaOH + NaNO_3 + 4Zn \rightarrow 4Na_2ZnO_2 + NH_3 + 2H_2O$$

$$NH_4NO_2 + NaOH \rightarrow NaNO_2 + NH_3 + H_2O$$

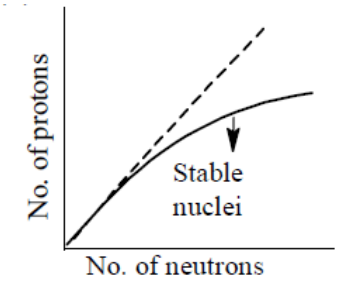
$$3Zn + 5NaOH + NaNO_2 \rightarrow 3Na_2ZnO_2 + NH_3 + H_2O$$

57. Sol. (D)

At equilibrium $\Delta G = 0, \Delta G^o$ of a reaction may or may not be zero.

For a spontaneous process $\Delta G < 0$

58. Sol. (A)



If the curve does not bend down towards the x axis then the proton-proton repulsion would overcome the attractive force of proton and neutron. Therefore, the curve bends down.

59. Sol. (C)

In bromobenzene, it is the mesomeric effect which directs the incoming electrophile.

60. Sol. (C)

The lower oxidation states for the group 14 elements are more stable for the heavier member of the group due to inert pair effect.

61. Sol. (C)

62. Sol. (C)

On going from top to bottom in nitrogen group the bond angle decreases due to more p-character in the bond pair and subsequently more s-character in lone pair orbital.

63. Sol. (B)

$$P_4 + 3NaOH + 3H_2O \rightarrow 3NaH_2PO_2 + PH_3$$

64. Sol. (D)

$$CH_3 - CH_2 - C \equiv C - CH_2 - CHO \xrightarrow[2.PBr_3]{1.NaBH_4} CH_3 - CH_2 - C \equiv C - CH_2 - CH_2Br$$

65. Sol. (A)

$$CH_3 - CH_2 - C \equiv C - CH_2 - CH_2Br \xrightarrow[3.H_3O^+]{1.Mg/Ether\ 2.CO_2} J \xrightarrow{K} CH_3 - CH_2 - C \equiv C - CH_2 - COCl$$

$J = CH_3 - CH_2 - C \equiv C - CH_2 - COOH$

$K = SOCl_2$

Hence, (A) is the correct answer.

66. Sol. (C)

67. Sol. (D)

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

$$2 \times \frac{0.1}{0.9 \times 46} \times 1000 = 4.83K$$

Freezing point of solution $M = 155.7 - 4.83 = 150.87K \approx 150.9K$

68. Sol. (B)

$$P = 0.9 \times 40 = 36\,mm\,Hg$$

69. Sol. (B)

$$\Delta T_b = K_b \times m$$

$$= 0.52 \times \frac{0.1}{0.9 \times 18} \times 1000 = 3.2K$$

$$T_b = 373 + 3.2 = 376.2\,K$$