JEE MAIN - 2014

CHEMISTRY

61. Sol. (2)

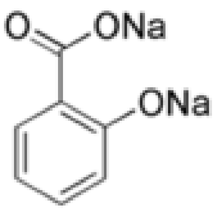
The polyester Dacron is an example of synthetic condensation polymers, also known as step-growth polymers. In contrast to chain-growth polymers, most of which grow by carbon-carbon bond formation, step-growth polymers generally grow by carbon-heteroatom bond formation $(C-O\ \&\ C-N$ in Dacron$)$. Although polymers of this kind might be considered to be alternating copolymers, the repeating monomeric unit is usually defined as a combined moiety.

62. Sol. (2)

Nitrogen oxide has an unpaired electron thereby making it Paramagnetic in nature.

63. Sol. (2)

Sodium phenoxide on heating with Carbon di oxide gives:



This on acetylation gives the required compound.

64. Sol. (2)

The required reaction can be obtained by multiplying the second equation by (-1) and adding the result with the first equation, i.e.:

$$Mn^{2} + 2e^{-} \rightarrow Mn$$

$$2Mn^{2+} \rightarrow 2Mn^{3+} + 2e^{-}$$

The net E^{0} value thus becomes:-$1.18-(1.51)=2.69\,\text{eV}$

65. Sol. (2)

The net number of moles is equal to: $(2+3)-(1+3)=1$ mole.

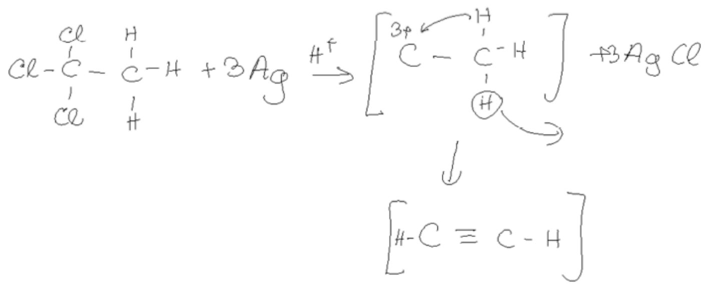
Hence, the Enthalpy of Combustion would be given by:

$$\Delta_c\text{H} = -1364.47 - 1\times(273+25)\times 8.314\times 10^{-3} = 1366.95\,\text{kJ/mol}$$

66. Sol. (2)

67. Sol.(2)

The reaction proceeds as follows:



68. Sol. (3)

Let us assume x atoms of oxygen and y atoms of nitrogen, then: $\frac{x \times 16}{y \times 14} = \frac{1}{4}$

On Cross multiplication, we get: $\frac{x}{y} = \frac{7}{32}$

69. Sol. (3)

Calcium fluoride is electrolyzed to get the calcium metal.

70. Sol. (4)

The variation for strong electrolytes is given by the required relation. Here the constant B is related to the viscosity.

71. Sol. (2)

The electronic configuration is given by: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$

Thus, the valence electron is in the 5th energy level. It thus $n = 5$.

It is in s shell, so $l = 0$.

Since, $l = 0, \text{so}\, m_l = 0$

Also, since there is a single electron, so the spin is $+1/2$.

72. Sol. (2)

All of them have the same osmotic pressure values.

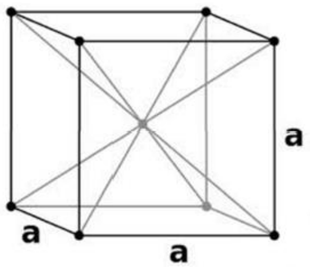
73. Sol. (1)

The reaction from alcohol to aldehyde needs a strong oxidising agent but not strong enough to oxidise it to an acid. Therefore, the most suitable choice is PCC .

74. Sol. (4)

For a *BCC* structure,

The length of the body diagonal is equal to √ $\sqrt{3}a$. Since, the positive and the negative charges lie half way across the diagonal so, the required answer is equal to $\frac{\sqrt{3}a}{2}$



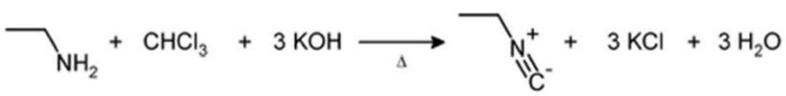
75. Sol. (1)

In both reactions (b) and (d), there is a loss in electrons on the reactant end and thereby there H_2O_2 acts as a reducing agent.

76. Sol. (1)

77. Sol. (1)

The reaction for ethylamine can be written as:



78. Sol. (3)

The alpha carbon is connected directly with the nucleophile in the case of CH_3Cl, thereby making it the most reactive. Also, as the number of carbons increase, the reactivity keeps on decreasing with the least reactivity being for the case when the alpha carbon is surrounded by three carbons.

79. Sol. (3)

The Ligan strength varies inversely with wavelengths (or directly with frequency). Hence, for ligand absorbing red light, the ligand strength is going to be least and of blue its going to be maximum.

80. Sol. (2)

In Reaction (1), the valencies of copper are not satisfied.

In Reaction (3), the valencies of cobalt are not satisfied.

In Reaction (4), the number of EDTA is not satisfied.

81. Sol. (4)

The reaction goes as follows:

$$CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH \xrightarrow{PCl_5} CH_3CH_2Cl \xrightarrow{Alc.KOH} CH_2 = CH_2$$

82. Sol. (3)

The molecule CsI_3 can be broken as:

$$CsI_3 \rightleftharpoons Cs^+ + I_3^-$$

83. Sol. (3)

The difference in number of moles is given by : $x = \Delta n = 1 - \left(1 + \frac{1}{2}\right) = -\frac{1}{2}$

84. Sol. (1)

We assume the rate law as given by: $\frac{dc}{dt} = k[A]^x [B]^y$

From the given data:

(i) $1.2\times10^{-3} = k[0.1]^x [0.1]^y$

(ii) $1.2\times10^{-3} = k[0.1]^x [0.2]^y$

(iii) $2.4\times10^{-3} = k[0.2]^x [0.1]^y$

Thus, we see that $x = 1, y = 0$. So we get the required answer.

85. Sol. (2)

86. Sol. (4)

With the same central atom E, acid strength increases as the number of oxygen attached to central metal atom increases. With the same number of oxygens around central metal atom, acid strength increases with the electronegativity of central metal atom.

87. Sol. (2)

Quinoline is a drug and the rest are protein rings.

88. Sol. (2)

The pKa value is maximum for $(CH_3)_2NH$ as the lone pairs of nitrogen atom are surrounded by the positive charge given by the methyl groups. This thereby makes thee pKb value the least among all.

89. Sol. (3)

We have the Modified Van der Waals equation given by : $\left(P+a\left(\frac{n}{V}\right)^2\right)(V-nb)=nRT$

Expressing as compressibility, we get: $P=\frac{nRT}{V-nb}-\alpha\left(\frac{n}{V}\right)^2$

Therefore, $Z=\frac{PV}{nRT}=\frac{V}{V-nb}-\frac{an}{RTV}\approx 1-\frac{an}{RTV}$

90. Sol. (1)