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### SOLUTION

76. \(4f \rightarrow n = 4\)
- \(l = 3\)
- \(m = -l \text{ to } +l\)
- \(-3 \text{ to } +3\)

77. \(24 \rightarrow 1s^22s^22p^63s^23p^64s^23d^5\)
- \(l = 1 \rightarrow p \rightarrow 12\)
- \(l = 2 \rightarrow d \rightarrow 5\)

78. \(\text{Li}^+ \; \text{F}^- \; \text{O}^2^- \; \text{B}^3+\)
79. $\frac{1}{\lambda} = R \left[ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$

$= 1.097 \times 10^7 \left( \frac{1}{1} \right)$

$\lambda = \frac{1}{1.097} \times 10^{-7}$ m

80. $H_2S \rightarrow sp^3$
$NH_3 \rightarrow sp^3$
$BF_3 \rightarrow sp^2$
$SiH_4 \rightarrow sp^3$

82. Al, Si, P, S acidity of oxides increases

83. Bond order of NO = 2.5
Bond order of NO$^+$ = 3
Higher the bond order shorter is the bond length

84. $O^{\cdot\cdot\cdot}(g) + e \rightarrow O^{2\cdot\cdot\cdot}(g)$
Due to the electronic repulsion, amount of the energy is needed to add electron

86. Total no of valence electrons
$= 3 + 7 \times 4 + 1 = 32$
Total No of hybrid orbital = 4
∴ Hybridisation = $sp^3$

88. $\frac{E_1}{E_2} = \frac{T_1}{T_2}$
$E_1 = 293$
$E_2 = 313$

∴ factor $= \frac{313}{293}$

89. $sp^3d^2$ hybridisation confirms to octahedral or square bipyramidal configuration
∴ all the bond angles are 90° in the structure

90. Von't Hoff's factor (i) for Na$_2$SO$_4$ is maximum i.e. 3 (maximum no of particles)
Na$_2$SO$_4 \rightarrow 2Na^+ + SO_4^{2-}$

92. In Vander Waals equation ‘b’ is the excluded volume i.e. the volume occupied by the molecules

93. $\therefore 6.02 \times 10^{20}$ molecules of urea is present in $\frac{0.0001 \times 1000}{100} = 0.01 M$

95. No. of gm equivalents of phosphorous acid
= No. of gm equivalents of KOH
$20 \times 0.1 \times 2$ (n = factor) = 0.1 x V
= 0.1 x V
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96. \( V = \frac{4}{0.1} = 40 \text{ ml} \)

97. \( \therefore \) the molecular weight of \( \text{C}_2\text{H}_5\text{OH} \) & \( \text{CH}_3\text{OCH}_3 \) are same so in its vapour phase at same temperature & pressure the densities will be same.

98. Benzene in methanol breaks the \( H-N \) bonding of the alcohol making its boiling point decrease & there by its vapour pressure increases leading two +ve deviation.

100. Work done = \(-P(\Delta V)\)
\[ = -1 \times 10^5 \left[10^{-2} - 10^{-3}\right] = -900 \text{ J} \]

102. \( t_{1/2} = 15 \text{ minutes} \)
\( \therefore \) No. of half lives \( s = 2 \)
\( (\therefore \) for change of 0.1 to 0.025) is 30 minutes

103. Applying law of mass action

104. \( K_p = K_c (RT)^h \)

105. As per property of equilibria reverse the equation & divide it by 2

107. \( E_{\text{cell}} = E_{\text{RHS}}^0 - E_{\text{LHS}}^0 \)
\[ = (0.77) - (-0.14) \]
\[ = 0.91 \text{ V} \]

108. \( K_{\text{sp}} = 108s^5 \)
\[ 1 \times 4^4 \times 5^4 = 256 \times 5^4 = K_{\text{sp}} \]

109. \( \therefore \) \( \log K_{\text{eq}} = \frac{nE^0}{0.0591} = 1 \times 0.591 \)
\[ \Rightarrow K_{\text{eq}} = 10^{10} \]

110. \( \text{C} + \text{O}_2 \longrightarrow \text{CO}_2 \quad \Delta H = -393.5 \text{ kJ} \)
\( 2\text{CO} + \frac{1}{2} \text{O}_2 \longrightarrow 2\text{CO}_2 \quad \Delta H = -283 \text{ kJ} \)
\( 2\text{C} + \text{O}_2 \longrightarrow 2\text{CO} \quad \Delta H = -110 \text{ kJ} \)

111. \( \Lambda_{\text{NaCl}} = \lambda_{\text{Na}}^0 + \lambda_{\text{Cl}}^0 = 126 \ldots (1) \)
\( \lambda_{\text{KBr}} = \lambda_{\text{K}}^0 + \lambda_{\text{Br}}^0 = 152 \ldots (2) \)
\( \Lambda_{\text{KCl}} = \lambda_{\text{K}}^0 + \lambda_{\text{Cl}}^0 = 150 \ldots (3) \)
\( \Lambda_{\text{NaBr}} = \lambda_{\text{Na}}^0 + \lambda_{\text{Br}}^0 \)
\( = 126 + 152 - 150 = 128 \)

115. \( \text{Mg}_3\text{N}_2 + 6\text{H}_2\text{O} \longrightarrow 3\text{Mg(OH)}_2 + 2\text{NH}_3 \)

117. \( \therefore \) Be & Al have diagonal relationship & so possess similar properties but Be cannot form polymeric hydrides

120. \( \therefore \) oxidation of potential of Cr is least & so it changes easily from +2 to +3 state

121. \( 2\text{CuSO}_4 + 4\text{KI (excess)} \longrightarrow 2\text{K}_2\text{SO}_4 + \text{Cu}_2 \text{I}_2 + \text{I}_2 \uparrow \)
\[
\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \rightarrow \text{Na}_2\text{S}_4\text{O}_6 + 2\text{NaI}
\]

124. \(\text{sp}^3\text{d}^2 \rightarrow \text{outer orbital octahedral complex}\)

125. Chlorophyll contains magnesium instead of calcium

126. Oxidation potential of Ce(IV) in aqueous solution is supposed to be -ve i.e. -0.784 V at 25°C

130. \(2^6 = \frac{200}{a-x}\)
    \[(a - x) = 3.125 \text{ gm}\]

135. It is having only \(\text{sp}^3\) & \(\text{sp}\) hybridized carbon atom

137. Rate of reaction will be fastest when \(Z\) is Cl because it is a weakest base

146. Benzaldehyde does not contain \(\alpha\) - hydrogen. Hence goes for cannizarro’s reaction forming alcohol and acid

147. Tertiary alcohols will undergo more easily dehydration than secondary & primary

149. Insulin