

144. For a cell involving one electron $E_{\text{cell}}^{\ominus} = 0.59 \text{ V}$ at 298 K, the equilibrium constant for the cell reaction is :

$$\left[\text{Given that } \frac{2.303 RT}{F} = 0.059 \text{ V at } T = 298 \text{ K} \right]$$

- (1) 1.0×10^2
 (2) 1.0×10^5
 (3) 1.0×10^{10}
 (4) 1.0×10^{30}
145. The manganate and permanganate ions are tetrahedral, due to :
- (1) The π -bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese
 (2) There is no π -bonding
 (3) The π -bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese
 (4) The π -bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese

146. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is :

- (1) 10
 (2) 20
 (3) 30
 (4) 40

147. A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The **correct** option about the gas and its compressibility factor (Z) is :

- (1) $Z > 1$ and attractive forces are dominant
 (2) $Z > 1$ and repulsive forces are dominant
 (3) $Z < 1$ and attractive forces are dominant
 (4) $Z < 1$ and repulsive forces are dominant

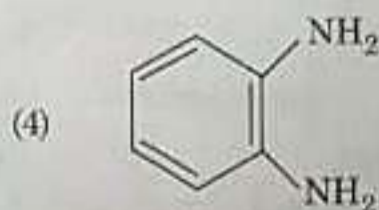
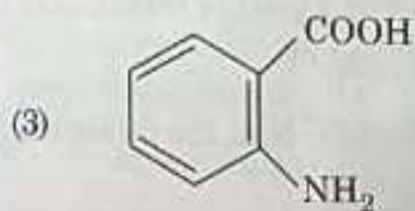
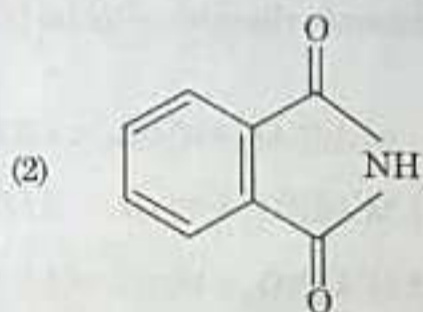
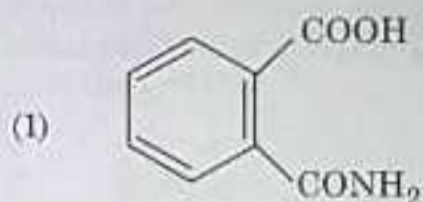
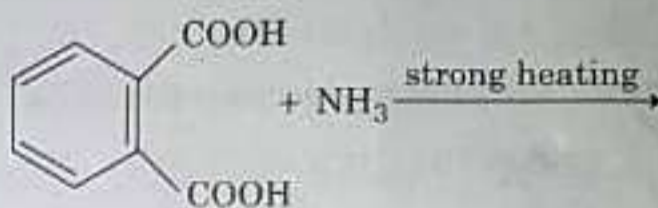
148. Which will make basic buffer ?

- (1) 50 mL of 0.1 M NaOH + 25 mL of 0.1 M CH_3COOH
 (2) 100 mL of 0.1 M CH_3COOH + 100 mL of 0.1 M NaOH
 (3) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH
 (4) 100 mL of 0.1 M HCl + 100 mL of 0.1 M NaOH

149. If the rate constant for a first order reaction is k , the time (t) required for the completion of 99% of the reaction is given by :

- (1) $t = 0.693/k$
 (2) $t = 6.909/k$
 (3) $t = 4.606/k$
 (4) $t = 2.303/k$

150. The major product of the following reaction is :



151. Conjugate base for Brønsted acids H_2O and HF are :

- (1) OH^- and H_2F^+ , respectively
 (2) H_3O^+ and F^- , respectively
 (3) OH^- and F^- , respectively
 (4) H_3O^+ and H_2F^+ , respectively

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152. Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is :

[Given that 1 L bar = 100 J]

- (1) - 30 J
- (2) 5 kJ
- (3) 25 J
- (4) 30 J

153. Which of the following species is **not** stable ?

- (1) $[\text{SiF}_6]^{2-}$
- (2) $[\text{GeCl}_6]^{2-}$
- (3) $[\text{Sn}(\text{OH})_6]^{2-}$
- (4) $[\text{SiCl}_6]^{2-}$

154. Which mixture of the solutions will lead to the formation of negatively charged colloidal $[\text{AgI}]^-$ sol. ?

- (1) 50 mL of 1 M AgNO_3 + 50 mL of 1.5 M KI
- (2) 50 mL of 1 M AgNO_3 + 50 mL of 2 M KI
- (3) 50 mL of 2 M AgNO_3 + 50 mL of 1.5 M KI
- (4) 50 mL of 0.1 M AgNO_3 + 50 mL of 0.1 M KI

155. Which one is malachite from the following ?

- (1) CuFeS_2
- (2) $\text{Cu}(\text{OH})_2$
- (3) Fe_3O_4
- (4) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$

156. Which of the following is **incorrect** statement?

- (1) PbF_4 is covalent in nature
- (2) SiCl_4 is easily hydrolysed
- (3) GeX_4 (X = F, Cl, Br, I) is more stable than GeX_2
- (4) SnF_4 is ionic in nature

157. The non-essential amino acid among the following is :

- (1) valine
- (2) leucine
- (3) alanine
- (4) lysine

158. Match the following :

- | | |
|----------------------|-----------------------------------|
| (a) Pure nitrogen | (i) Chlorine |
| (b) Haber process | (ii) Sulphuric acid |
| (c) Contact process | (iii) Ammonia |
| (d) Deacon's process | (iv) Sodium azide or Barium azide |

Which of the following is the **correct** option ?

- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|-------|-------|
| (1) | (i) | (ii) | (iii) | (iv) |
| (2) | (ii) | (iv) | (i) | (iii) |
| (3) | (iii) | (iv) | (ii) | (i) |
| (4) | (iv) | (iii) | (ii) | (i) |

159. Among the following, the narrow spectrum antibiotic is :

- (1) penicillin G
- (2) ampicillin
- (3) amoxycillin
- (4) chloramphenicol

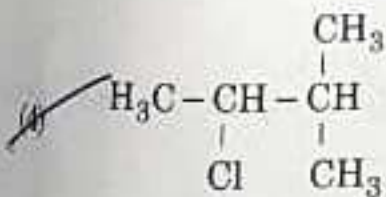
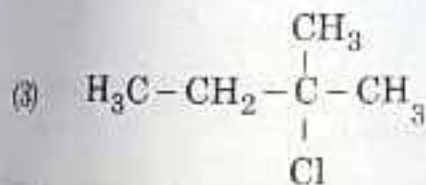
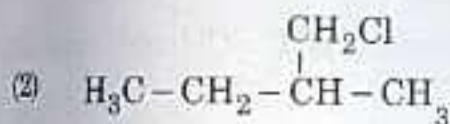
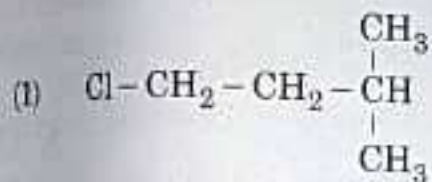
160. Which of the following is an amphoteric hydroxide ?

- (1) $\text{Sr}(\text{OH})_2$
- (2) $\text{Ca}(\text{OH})_2$
- (3) $\text{Mg}(\text{OH})_2$
- (4) $\text{Be}(\text{OH})_2$

161. Which of the following diatomic molecular species has only π bonds according to Molecular Orbital Theory?

- (1) O_2
 (2) N_2
 (3) C_2
 (4) Be_2

162. An alkene "A" on reaction with O_3 and $Zn-H_2O$ gives propanone and ethanal in equimolar ratio. Addition of HCl to alkene "A" gives "B" as the major product. The structure of product "B" is:



163. The biodegradable polymer is:

- (1) nylon-6, 6
 (2) nylon 2-nylon 6
 (3) nylon-6
 (4) Buna-S

164. The number of sigma (σ) and pi (π) bonds in pent-2-en-4-yne is:

- (1) 10 σ bonds and 3 π bonds
 (2) 8 σ bonds and 5 π bonds
 (3) 11 σ bonds and 2 π bonds
 (4) 13 σ bonds and no π bond

165. The correct order of the basic strength of methyl substituted amines in aqueous solution is:

- (1) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$
 (2) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$
 (3) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$
 (4) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$

166. What is the correct electronic configuration of the central atom in $K_4[Fe(CN)_6]$ based on crystal field theory?

- (1) $t_{2g}^4 e_g^2$
 (2) $t_{2g}^6 e_g^0$
 (3) $e^3 t_2^3$
 (4) $e^4 t_2^2$

167. Among the following, the one that is **not** a green house gas is:

- (1) nitrous oxide
 (2) methane
 (3) ozone
 (4) sulphur dioxide

168. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is:

- (1) C_2A_3
 (2) C_3A_2
 (3) C_3A_4
 (4) C_4A_3

169. For an ideal solution, the correct option is :

- (1) $\Delta_{\text{mix}} S = 0$ at constant T and P
- (2) $\Delta_{\text{mix}} V \neq 0$ at constant T and P
- (3) $\Delta_{\text{mix}} H = 0$ at constant T and P
- (4) $\Delta_{\text{mix}} G = 0$ at constant T and P

170. The compound that is most difficult to protonate is :

- (1)
- (2)
- (3)
- (4)

171. 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is :

- (1) $5f > 6p > 5p > 4d$
- (2) $6p > 5f > 5p > 4d$
- (3) $6p > 5f > 4d > 5p$
- (4) $5f > 6p > 4d > 5p$

172. The mixture that forms maximum boiling azeotrope is :

- (1) Water + Nitric acid
- (2) Ethanol + Water
- (3) Acetone + Carbon disulphide
- (4) Heptane + Octane

173. In which case change in entropy is negative ?

- (1) Evaporation of water
- (2) Expansion of a gas at constant temperature
- (3) Sublimation of solid to gas
- (4) $2\text{H}(\text{g}) \rightarrow \text{H}_2(\text{g})$

174. pH of a saturated solution of $\text{Ca}(\text{OH})_2$ is 9. The solubility product (K_{sp}) of $\text{Ca}(\text{OH})_2$ is :

- (1) 0.5×10^{-15}
- (2) 0.25×10^{-10}
- (3) 0.125×10^{-15}
- (4) 0.5×10^{-10}

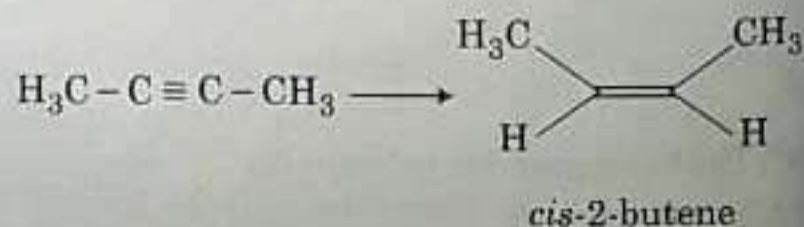
175. Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region ?

- (1) Lyman series
- (2) Balmer series
- (3) Paschen series
- (4) Brackett series

176. Identify the incorrect statement related to PCl_5 from the following :

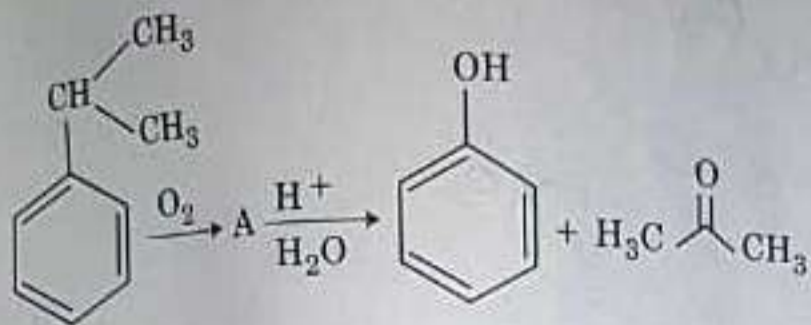
- (1) Three equatorial P-Cl bonds make an angle of 120° with each other
- (2) Two axial P-Cl bonds make an angle of 180° with each other
- (3) Axial P-Cl bonds are longer than equatorial P-Cl bonds
- (4) PCl_5 molecule is non-reactive

177. The most suitable reagent for the following conversion, is :

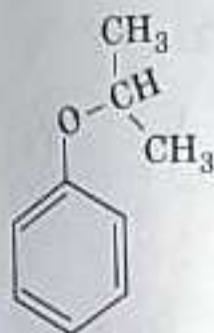
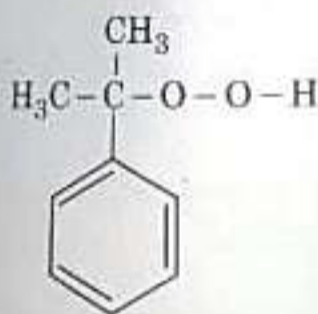


- (1) Na / liquid NH_3
- (2) H_2 , Pd / C, quinoline
- (3) Zn / HCl
- (4) $\text{Hg}^{2+} / \text{H}^+$, H_2O

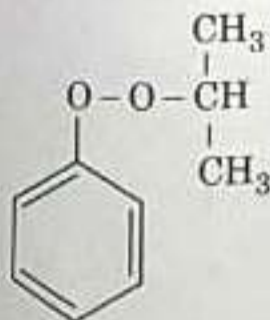
178. The structure of intermediate A in the following reaction, is :



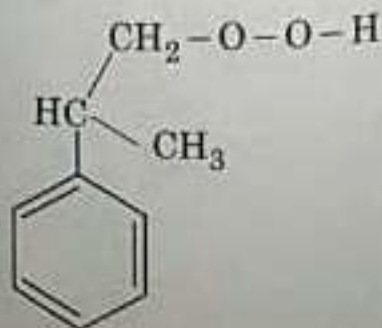
(1)

~~(2)~~

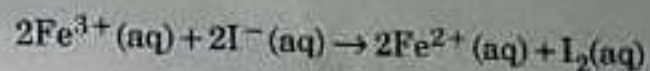
(3)



(4)



179. For the cell reaction



$E_{\text{cell}}^{\ominus} = 0.24 \text{ V}$ at 298 K. The standard Gibbs energy ($\Delta_r G^{\ominus}$) of the cell reaction is :

[Given that Faraday constant $F = 96500 \text{ C mol}^{-1}$]

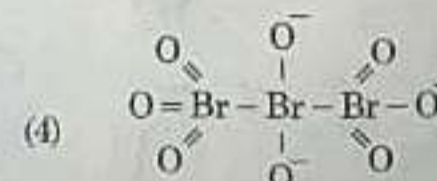
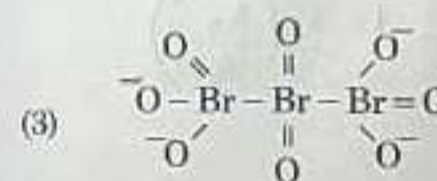
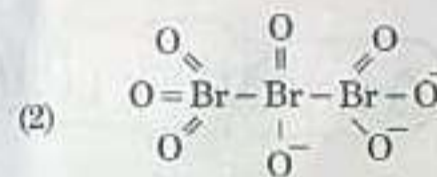
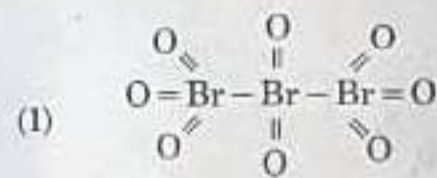
(1) $-46.32 \text{ kJ mol}^{-1}$

(2) $-23.16 \text{ kJ mol}^{-1}$

(3) $46.32 \text{ kJ mol}^{-1}$

(4) $23.16 \text{ kJ mol}^{-1}$

180. The correct structure of tribromooctaoxide is :



- o o o -