Part - B (Chemistry)

136. The correct difference between first and second order reactions is that

(1) the half-life of a first order reactions does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$

(2) a first-order reaction can be catalysed; a second order reaction cannot be catalyzed

(3) the rate of a first order reaction does not depend on reactant concentrations; the rate of a second order reaction does depend on reactant concentrations

(4) the rate of a first order reaction does depend on reactant concentrations; the rate of a second order reaction does not depend on reactant concentrations

Ans: [1]

137. Among CaH_2, BeH_2, BaH_2, the order of ionic character is

(1) $CaH_2 < BeH_2 < BaH_2$

(2) $BeH_2 < BaH_2 < CaH_2$

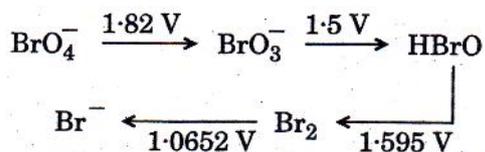(3) $BeH_2 < CaH_2 < BaH_2$

(4) $BaH_2 < BeH_2 < CaH_2$

Ans: [3]

138. In which case is the number of molecules of water maximum?

(1) 0.18 g of water

(2) 0.00224 L of water vapours at 1 atm and 273 K

(3) 18 mL of water

(4) 10^{-3} mol of water

Ans: [3]

139. Consider the change in oxidation state of Bromine corresponding to different emf values as shown int he diagram below:

Then the species undergoing disproportionation is

(1) BrO_4^- (2) Br_2

(3) BrO_3^- (4) HBrO

Ans: [4]

140. In the structure of ClF_3, the number of lone pair of electrons in central atom 'Cl' is

(1) two   (2) four

(3) one   (4) three

Ans: [1]

141. The correct order of N-compound in it decreasing order of oxidation states is

(1) HNO_3, NO, NH_4Cl, N_2

(2) HNO_3, NH_4Cl, NO, N_2

(3) HNO_3, NO, N_2, NH_4Cl

(4) NH_4Cl, N_2, NO, HNO_3

Ans: [3]

142. Which one of the following is unable to form MF_6^{3-} ion?

(1) Al   (2) B

(3) Ga   (4) In

Ans: [2]

143. The correct order of atomic radii in group element is

(1) $B < Al < Ga < In < Tl$ (2) $B < Ga < Al < Tl < In$

(3) $B < Al < In < Ga < Tl$ (4) $B < Ga < Al < In < Tl$

Ans: [4]

144. Considering Ellingham diagram, which of the following metals can be used to reduce aluminium?

(1) Zn   (2) Mg

(3) Fe   (4) Cu

Ans: [2]

145. Which of the following statements is **not** true about halogens?

(1) All are oxidizing agents

(2) All but fluorine show positive oxidation states

(3) All form monobasic oxyacids

(4) Chlorine has the highest electron-paid enthalpy

Ans: [1]

146. Regarding cross-linked or network polymers, which of the following statements is **incorrect**?

(1) They are formed from bi- and tri-functional monomers

(2) Examples are bakelite and melamine

(3) They contain covalent bonds between various linear polymer chains

(4) They contain strong covalent bonds in their polymer chains

Ans: [3]

147. The difference between amylose and amylopectin is

(1) Amylose have $1 \rightarrow 4$ α – linkage and $1 \rightarrow 6$ β – linkage

(2) Amylopectin have $1 \rightarrow 4$ α – linkage and $1 \rightarrow 6$ β – linkage

(3) Amylopectin have $1 \rightarrow 4$ α – linkage and $1 \rightarrow 6$ α – linkage

(4) Amylose is made up of glucose and galactose

Ans: [3]

148. Nitration of aniline in strong acidic medium also gives m-nitroaniline because

(1) In electrophilic substitution reactions amino group is meta directive

(2) In absence of substituents nitro group always goes to m-position

(3) In spite of substituents nitro group always goes to only m-position

(4) In acidic (strong) medium aniline is present as anilinium ion

Ans: [4]

149. Which of the following oxides is most acidic in nature?

(1) BeO   **(2)** BaO

(3) MgO   **(4)** CaO

Ans: [1]

150. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with conc. H_2SO_4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be

(1) 3.0   **(2)** 2.8

(3) 1.4   **(4)** 4.4

Ans: [2]

151. The compound A on treatment with Na gives B, and with PCl_5 gives C. B and C react together to gives diethyl ether. A, B and C are in the order

(1) $C_2H_5OH, C_2H_5Cl, C_2H_5ONa$

(2) $C_2H_5Cl, C_2H_6, C_2H_5OH$

(3) $C_2H_5OH, C_2H_6, C_2H_5Cl$

(4) $C_2H_5OH, C_2H_5ONa, C_2H_5Cl$

Ans: [4]

152. Hydrocarbon (A) reacts with bromine by substitution to form an alkyl bromide which by Wurtz reaction is converted to gaseous hydrocarbon containing less than four carbon atoms. (A) is

(1) $CH_2 = CH_2$ **(2)** $CH_3 - CH_3$
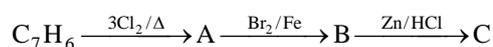
(3) $CH \equiv CH$ **(4)** CH_4

Ans: [4]

153. Which oxide of nitrogen is **not** a common pollutant introduced into the atmosphere both due to natural and hyman activity?

(1) NO_2 **(2)** N_2O

(3) N_2O_5 **(4)** NO

Ans: [3]

154. The compound C_7H_6 undergoes the following reactions:

$$C_7H_6 \xrightarrow{3Cl_2/\Delta} A \xrightarrow{Br_2/Fe} B \xrightarrow{Zn/HCl} C$$

The product 'C' is

(1) *o*-bromotoluene

(2) 3-bromo-2,4,6-trichlorotoluene

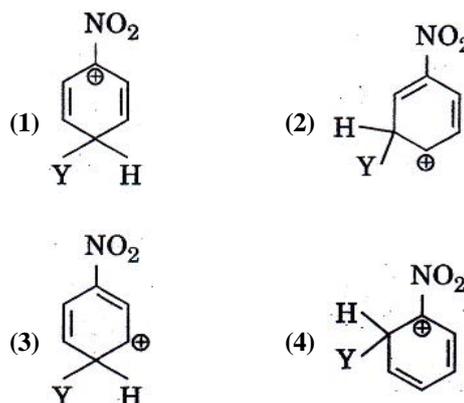**(3)** *m*-bromotoluene

(4) *p*-bromotoluene

Ans: [4]

155. Which of the following molecules represent the order of hybridisation sp^2, sp^2, sp, sp from left to right atoms?

(1) $CH_2 = CH - C \equiv CH$

(2) $CH_2 = CH - CH = CH_2$

(3) $HC \equiv C - C \equiv CH$

(4) $CH_3 - CH = CH - CH_3$

Ans: [1]

156. Which of the following carbocations is expected to be most stable?

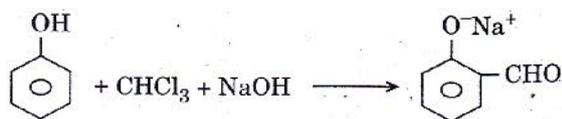**Ans: [2]**

157. Which of the following is correct with respect to –I effect of the substitutents? (R = alkyl)

(1) $-NR_2 < -OR < -F$ (2) $-NH_2 > -OR > -F$

(3) $-NH_2 < -OR < -F$ (4) $-NR_2 > -OR > -F$

Ans: [1,3]

158. In the reaction

the electrophile involved is

(1) formyl cation $\left(\overset{\oplus}{C}HO \right)$

(2) dichloromethyl anion $\left(\overset{\ominus}{C}HCl_2 \right)$

(3) dichloromethyl cation $\left(\overset{\oplus}{C}HCl_2 \right)$

(4) dichlorocarbene $\left(:CCl_2 \right)$

Ans: [4]

159. Carboxylic acids have higher boiling points than aldehydes, ketones and even alcohols of comparable molecular mass. It is due to their

(1) formation of carboxylate ion

(2) more extensive association of carboxylic acid via van der Waals force of attraction

(3) formation of intramolecular H-bonding
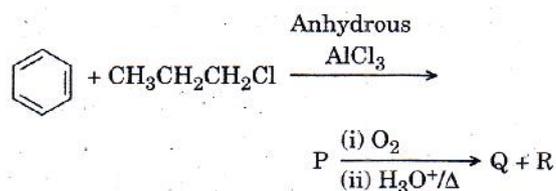
(4) formation of intermolecular H-bonding

Ans: [4]

160. Compound A, $C_8H_{10}O$, is found to react with NaOI (Produced by reacting Y and NaOH) and yields a yellow precipitate with characteristic smell. A and Y are respectively

Ans: [2]

161. Identify the major products P, Q and R int he following sequence of reactions :

Ans: [4]

162. Which of the following compounds can form a zwitter ion?

(1) Acetanilide   (2) Benzoic acid

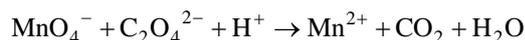(3) Aniline   (4) Glycine

Ans: [4]

163. The correction factor 'a' in the ideal gas equation corresponds to

(1) volume of the gas molecules

(2) electric field present betwen the gas molecules

(3) density of the gas molecules

(4) forces of attraction between the gas molecules

Ans: [4]

164. For the redox reaction

$$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$$

the corect coefficients of the reactants for the balanced equation are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	5	16
(2)	2	16	5
(3)	16	5	2
(4)	5	16	2

Ans: [1]

165. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction

(1) is doubled

(2) is tripled

(3) is halved

(4) remains unchanged

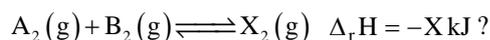**Ans: [1]**

166. The bond dissociation energies of X_2, Y_2 and XY are in the ratio of $1 : 0.5 : 1$, ΔH for the formation of XY is $-200\,kJ\,mol^{-1}$. The bond dissociation energy of X_2 will be

(1) $100\,kJ\,mol^{-1}$ (2) $800\,kJ\,mol^{-1}$

(3) $200\,kJ\,mol^{-1}$ (4) $400\,kJ\,mol^{-1}$

Ans: [2]

167. Which one ofthe following conditions will favour maximum formation of the product in the reaction,

$$A_2(g) + B_2(g) \rightleftharpoons X_2(g) \quad \Delta_r H = -X\,kJ\,?$$

(1) Low temperature and low pressure

(2) Hiw temperature and high presrure

(3) Low temperature and high pressure

(4) High temperature and low pressure

Ans: [3]

168. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density fo iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with tempeature) is

(1) $\dfrac{4\sqrt{3}}{3\sqrt{2}}$ (2) $\dfrac{3\sqrt{3}}{4\sqrt{2}}$

(3) $\dfrac{\sqrt{3}}{\sqrt{2}}$ (4) $\dfrac{1}{2}$

Ans: [2]

169. Consider the following species:

$$CN^+, \ CN^-, \ NO \ \text{and} \ CN$$

Which one of these will have the highest bond order?

(1) CN^- (2) CN^+

(3) NO   (4) CN

Ans: [1]

170. Magnesium reacts wtih an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\,2s^2\,2p^3$, the simplest formula for this compound is

(1) MgX_2 (2) Mg_2X

(3) Mg_2X_3 (4) Mg_3X_2
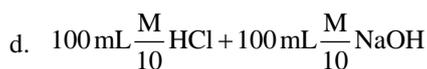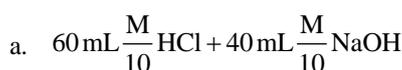
Ans: [4]

171. Which one is a **wrong** statement?

(1) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers

(2) The electronic configuration of N atom is
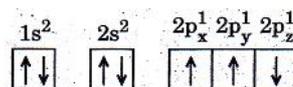
(3) Total orbital angular momentum of electron in 's' orbital is equal to zero

(4) The value of m for d_{z^2} is zero

Ans: [2]

172. Following solutions were prepared by mixing different volumes of NaOH and HCl of different concentrations:

a. $60\,mL\,\dfrac{M}{10}\,HCl + 40\,mL\,\dfrac{M}{10}\,NaOH$

b. $55\,mL\,\dfrac{M}{10}\,HCl + 45\,mL\,\dfrac{M}{10}\,NaOH$

c. $75\,mL\,\dfrac{M}{5}\,HCl + 25\,mL\,\dfrac{M}{5}\,NaOH$

d. $100\,mL\,\dfrac{M}{10}\,HCl + 100\,mL\,\dfrac{M}{10}\,NaOH$

pH of which one of them will be equal to 1?

(1) a   (2) d

(3) b   (4) c

Ans: [4]

173. On which of the following properties does the coagulating power of an ion depend?

(1) Size of the ion alone

(2) Both magnitude and sign of the charge on the ion

(3) The magnitude of the charge on the ion alone

(4) The sign of charge on the ion alone

Ans: [3]

174. Given van der Waals constant for NH_3, H_2, O_2 and CO_2 are respectively 4.17, 0.244, 1.36 and 3.59 which one of the following gases is most easily liquefied?

(1) H_2

(2) O_2

(3) NH_3

(4) CO_2

Ans: [3]

175. The stability of $BaSO_4$ in water is $2.42 \times 10^{-3}\,gL^{-1}$ at 298 K. The value of the solubility product (K_{sp}) will be

(Given molar mass of $BaSO_4 = 233\,g\,mol^{-1}$)

(1) $1.08 \times 10^{-12}\,mol^2\,L^{-2}$ **(2)** $1.08 \times 10^{-14}\,mol^2\,L^{-2}$

(3) $1.08 \times 10^{-10}\,mol^2\,L^{-2}$ **(4)** $1.08 \times 10^{-8}\,mol^2\,L^{-2}$

Ans: [3]

176. The type of isomerism shown by the complex $[CoCl_2(en)_2]$ is

(1) Coordination isomerism

(2) Ionization isomerism

(3) Geometrical isomerism

(4) Linkage isomerism

Ans: [3]

177. Which one fo the following ions exhibits d-d transition and paramagnetism as well?

(1) $Cr_2O_7^{2-}$

(2) MnO_4^-

(3) CrO_4^{2-}

(4) MnO_4^{2-}

Ans: [4]

178. Iron carbonyl $Fe(CO)_5$ is

(1) mononuclear

(2) trinuclear

(3) tetranuclear

(4) dinuclear

Ans: [1]

179. Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code:

	Column I		Column II
a.	CO^{3+}	i.	$\sqrt{8}$ B.M.
b.	Cr^{3+}	ii.	$\sqrt{35}$ B.M.
c.	Fe^{3+}	iii.	$\sqrt{3}$ B.M.
d.	Ni^{2+}	iv.	$\sqrt{24}$ B.M.
		v.	$\sqrt{15}$ B.M.

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

Ans: [3]

180. The geometry and magnetic behaviour fo the complex $[Ni(CO)_4]$ are

(1) tetrahedral geometry and diamagnetic

(2) square planar geometry and paramagnetic

(3) square planar geometry and diamagentic

(4) tetrahedral geometry and paramagnetic

Ans: [1]