

Part - A (Chemistry)

136. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as

- (1) Cross Cannizzaro's reaction
- (2) Cross Aldol condensation
- (3) Aldol condensation
- (4) Cannizzaro's reaction

Ans: [2]

137. Measuring Zeta potentials is useful in determining which property on collidal solution?

- (1) Stability of the colloidal particles
- (2) Size of the calloidal particles
- (3) Viscosity
- (4) Solubility

Ans: [1]

138. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following?

- (1) -R effect of -CH₃ groups
- (2) Hyperconjugation
- (3) -I effect of -CH₃ groups
- (4) +R effect of -CH₃ groups

Ans: [2]

139. The **correct** option for free expansion of an ideal gas under adiabatic condition is

- (1) $q < 0, \Delta T = 0$ and $w = 0$
- (2) $q > 0, \Delta T > 0$ and $w > 0$
- (3) $q = 0, \Delta T = 0$ and $w = 0$
- (4) $q = 0, \Delta T < 0$ and $w > 0$

Ans: [3]

140. Match the following

Oxide	Nature
(a) CO	(i) Basic
(b) BaO	(ii) Neutral
(c) Al ₂ O ₃	(iii) Acidic
(d) Cl ₂ O ₇	(iv) Amphoteric
(1) a-iii, b-iv, c-i, d-ii	(2) a-iv, b-iii, c-ii, d-i
(3) a-i, b-ii, c-iii, d-iv	(4) a-ii, b-i, c-iv, d-iii

Ans: [4]

141. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give

- (1) Tert. butyl alcohol
- (2) Isobutyl alcohol
- (3) Isopropyl alcohol
- (4) Sec. butyl alcohol

Ans: [1]

142. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na is responsible for the transmission of nerve signals.

- (1) Calcium
- (2) Potassium
- (3) Iron
- (4) Copper

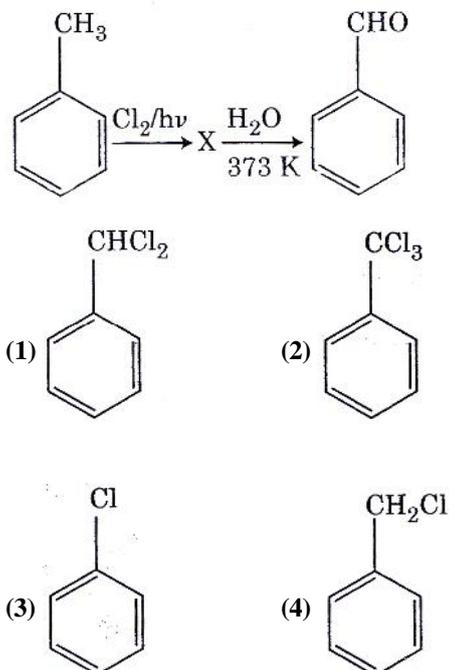
Ans: [2]

143. Which of the following ia a basic amino acid?

- (1) Tyrosine
- (2) Lysine
- (3) Serine
- (4) Alanine

Ans: [2]

144. Identity compound X in the following sequence reactions:



Ans: [1]

145. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds?

- (1) $F^- < SCN^- < C_2O_4^{2-} < CN^-$
- (2) $CN^- < C_2O_4^{2-} < SCN^- < F^-$
- (3) $SCN^- < F^- < C_2O_4^{2-} < CN^-$
- (4) $SCN^- < F^- < CN^- < C_2O_4^{2-}$

Ans: [3]

146. Which of the following is a cationic detergent?

- (1) Cetyltrimethyl ammonium bromide
- (2) Sodium dedecylbenzene sulphonate
- (3) Sodium lauryl sulphate
- (4) Sodium stearate

Ans: [1]

147. Which one of the following has maximum number of atoms?

- (1) 1 g of $O_2(g)$ [Atomic mass of O = 16]
- (2) 1 g of Li(s) [Atomic mass of Li = 7]
- (3) 1 g of Ag(s) [Atomic mass of Ag = 108]
- (4) 1 g of Mg(s) [Atomic mass of Mg = 24]

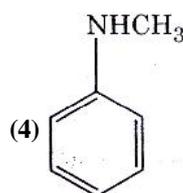
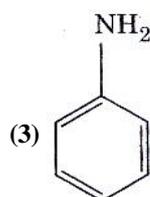
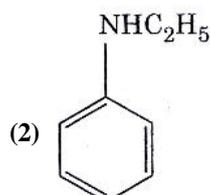
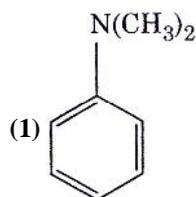
Ans: [2]

148. Identify the incorrect match.

Name	IUPAC official Name
(a) Unnilunium	(i) Mendeleevium
(b) Unnitrium	(ii) Lawrencium
(c) Unnilhexium	(iii) Seaborgium
(d) Unununium	(iv) Darmstadtium
(1) (c), (iii)	(2) (d), (iv)
(3) (a), (i)	(4) (b), (ii)

Ans: [2]

149. Which of the following amine will give the carbylamine test?



Ans: [3]

150. Paper chromatography is an example of

- (1) Thin layer chromatography
- (2) Column chromatography
- (3) Adsorption chromatography
- (4) Partition chromatography

Ans: [4]

151. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is

[Use atomic masses (in $g\ mol^{-1}$): N = 14, Ar = 40]

- (1) 15 bar
- (2) 18 bar
- (3) 9 bar
- (4) 12 bar

Ans: [1]

152. The number of protons, neutrons and electrons in ${}_{71}^{175}\text{Lu}$ respectively, are

- (1) 71, 71 and 104 (2) 175, 104 and 71
(3) 71, 104 and 71 (4) 104, 71 and 71

Ans: [3]

153. The rate constant for a first order reaction is $4.606 \times 10^{-3} \text{ s}^{-1}$. The time required to reduce 2.0 g of the reactant to 0.2 g is

- (1) 500 s (2) 1000 s
(3) 100 s (4) 200 s

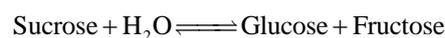
Ans: [1]

154. Identify a molecule which does **not** exist

- (1) C_2 (2) O_2
(3) He_2 (4) Li_2

Ans: [3]

155. Hydrolysis of sucrose is given by the following reaction



If the equilibrium constant (K_c) is 2×10^{13} at 300 K, the value of $\Delta_r G^\circ$ at the same temperature will be

- (1) $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300\text{K} \times \ln(3 \times 10^{13})$
(2) $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300\text{K} \times \ln(4 \times 10^{13})$
(3) $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300\text{K} \times \ln(2 \times 10^{13})$
(4) $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300\text{K} \times \ln(2 \times 10^{13})$

Ans: [3]

156. For the reaction, $2\text{Cl}(\text{g}) \rightarrow \text{Cl}_2(\text{g})$, the **correct** option is

- (1) $\Delta_r H < 0$ and $\Delta_r S > 0$
(2) $\Delta_r H < 0$ and $\Delta_r S < 0$
(3) $\Delta_r H > 0$ and $\Delta_r S > 0$
(4) $\Delta_r H > 0$ and $\Delta_r S < 0$

Ans: [2]

157. Find out the solubility of $\text{Ni}(\text{OH})_2$ in 0.1 M NaOH. Given that the ionic product of $\text{Ni}(\text{OH})_2$ is 2×10^{-15} .

- (1) $1 \times 10^{-13} \text{ M}$ (2) $1 \times 10^8 \text{ M}$
(3) $2 \times 10^{-13} \text{ M}$ (4) $2 \times 10^{-8} \text{ M}$

Ans: [3]

158. On electrolysis of dil. sulphuric acid using Platinum (Pt) electrode, the product obtained anode will be

- (1) H_2S gas (2) SO_2 gas
(3) Hydrogen gas (4) Oxygen gas

Ans: [4]

159. Which of the following is **not** correct about carbon monoxide?

- (1) The carboxhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin
(2) It is produced due to incomplete combustion
(3) It forms carboxhaemoglobin
(4) It reduces oxygen carrying ability of blood

Ans: [1]

160. The number of Faradays (F) required to produce 20 g of calcium from molten CaCl_2

(Atomic mass of Ca = 40 g mol^{-1}) is

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

Ans: [3]

161. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is

- (a) β -Elimination reaction
(b) Follows Zaitsev rule
(c) Dehydrohalogenation reaction
(d) Dehydration reaction

- (1) b, c, d
(2) a, b, d
(3) a, b, c
(4) a, c, d

Ans: [3]



162. What is the change in oxidation number of carbon in the following reaction?

- (1) -4 to $+4$ (2) 0 to -4
(3) $+4$ to $+4$ (4) 0 to $+4$

Ans: [1]

163. Which of the following alkane cannot be made in good yield by Wurtz reaction?

- (1) n-Heptane
(2) n-Butane
(3) n-Hexane
(4) 2,3-Dimethylbutane

Ans: [1]

164. Sucrose on hydrolysis gives:

- (1) α -D-Glucose + β -D-Fructose
(2) α -D-Fructose + β -D-Fructose
(3) β -D-Glucose + α -D-Fructose
(4) α -D-Glucose + β -D-Glucose

Ans: [1]

165. Identify the **incorrect** statement

- (1) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals
(2) The oxidation states of chromium in $\text{Cr}_2\text{O}_4^{2-}$ and $\text{Cr}_2\text{O}_7^{2-}$ are not the same
(3) $\text{Cr}^{2+}(\text{d}^4)$ is a stronger reducing agent than $\text{Fe}^{2+}(\text{d}^6)$ in water
(4) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states to form complexes

Ans: [2]

166. HCl was passed through a solution of CaCl_2 , MgCl_2 and NaCl . Which of the following compound(s) crystallise(s)

- (1) Only MgCl_2
(2) NaCl , MgCl_2 and CaCl_2
(3) Both MgCl_2 and CaCl_2
(4) Only NaCl

Ans: [4]

167. Identify the **correct** statements from to following

- (a) $\text{CO}_2(\text{g})$ is used as refrigerant for ice-cream and frozen food
(b) The structure of C_{60} contains twelve six carbon rings and twenty five carbon ring
(c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline
(d) CO is colorless and odourless gas
(1) (b) and (c) only
(2) (c) and (d) only
(3) (a), (b) and (c) only
(4) (a) and (c) only

Ans: [2]

168. An increase in the concentration of the reactant of a reaction leads to change in

- (1) threshold energy
(2) collision frequency
(3) activation energy
(4) heat of reaction

Ans: [2]

169. The calculated spin only magnetic moment of Cr^{2+} ion is

- (1) 5.92 BM
(2) 2.84 BM
(3) 3.87 BM
(4) 4.90 BM

Ans: [4]

170. Match the following and identify the **correct** option

- | | |
|--|---|
| (a) $\text{CO}(\text{g}) + \text{H}_2(\text{g})$ | (i) $\text{Mg}(\text{HCO}_3)_2 + \text{Ca}(\text{HCO}_3)_2$ |
| (b) Temporary hardness of water | (ii) An electron deficient hydrid |
| (c) B_2H_6 | (iii) Synthesis gas |
| (d) H_2O_2 | (iv) Non-planar structure |
- (1) a-iii, b-iv, c-ii, d-i
(2) a-i, b-iii, c-ii, d-iv
(3) a-iii, b-i, c-ii, d-iv
(4) a-iii, b-ii, c-i, d-iv

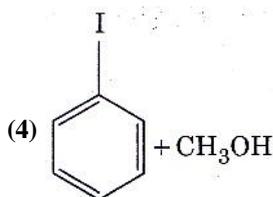
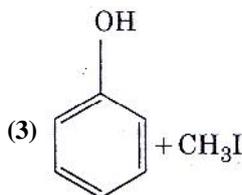
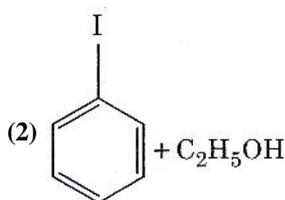
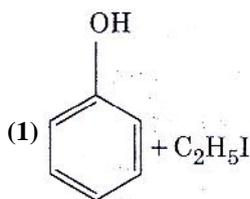
Ans: [3]

171. The mixture which shows positive deviation from Raoult's law is

- (1) Acetone + Chloroform
- (2) Chloroethane + Bromoethane
- (3) Ethanol + Acetone
- (4) Benzene + Toluene

Ans: [3]

172. Anisole on cleavage with HI gives:



Ans: [3]

173. Urea reacts with water of form **A** which will decompose to form **B**. **B** when passed through Cu²⁺ (aq) deep blue colour solution **C** is formed. What is the formula of **C** from the following?

- (1) Cu(OH)₂
- (2) CuCO₃·Cu(OH)₂
- (3) CuSO₄
- (4) [Cu(NH₃)₄]²⁺

Ans: [4]

174. The freezing point depression constant (K_f) of benzene is 5.12 K kg mol⁻¹. The freezing point depression for the solution of molality 0.078 m containing a non-electrolyte solute in benzene is (rounded off upto two decimal places)

- (1) 0.40 K
- (2) 0.60 K
- (3) 0.20 K
- (4) 0.80 K

Ans: [1]

175. Which of the following oxoacid of sulphur has –O–O– linkage?

- (1) H₂S₂O₈, peroxodisulphuric acid
- (2) H₂S₂O₇, pyrosulphuric acid
- (3) H₂SO₃, sulphurous acid
- (4) H₂SO₄, sulphuric acid

Ans: [1]

176. Identify the **correct** statement from the following

- (1) Vapour phase refining is carried out for Nickel by Van Arkel method
- (2) Pig iron can be moulded into a variety of shapes
- (3) Wrought iron is impure iron with 4% carbon
- (4) Blister copper has blistered appearance due to evolution of CO₂

Ans: [2]

177. Which of the following is a natural polymer?

- (1) polybutadiene
- (2) poly (Butadiene-acrylonitrile)
- (3) *cis*-1, 4-polyisoprene
- (4) poly (Butadiene-styrene)

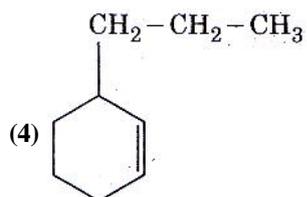
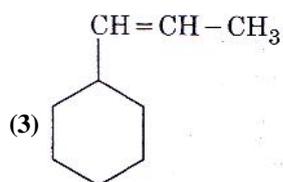
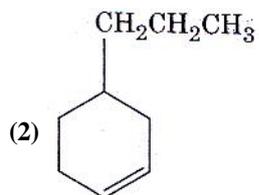
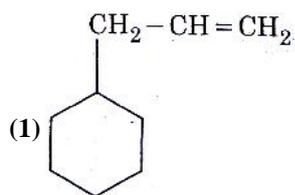
Ans: [3]

178. An element has a body centred cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is

- (1) $\frac{4}{\sqrt{3}} \times 288$ pm
- (2) $\frac{4}{\sqrt{2}} \times 288$ pm
- (3) $\frac{\sqrt{3}}{4} \times 288$ pm
- (4) $\frac{\sqrt{2}}{4} \times 288$ pm

Ans: [3]

179. An alkene on ozonolysis gives methanal as one of the product. Its structure is



Ans: [1]

180. Which of the following set of molecules will have zero dipole moment?

- (1) Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
- (2) Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
- (3) Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene
- (4) Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene

Ans: [2]