

131. A ray is incident at an angle of incidence i on one surface of a small angle prism (with angle of prism A) and emerges normally from the opposite surface. If the refractive index of the material of the prism is μ , then the angle of incidence is nearly equal to :

- (1) $\frac{A}{2\mu}$
 (2) $\frac{2A}{\mu}$
 (3) μA
 (4) $\frac{\mu A}{2}$

132. The quantities of heat required to raise the temperature of two solid copper spheres of radii r_1 and r_2 ($r_1 = 1.5 r_2$) through 1 K are in the ratio :

- (1) $\frac{27}{8}$
 (2) $\frac{9}{4}$
 (3) $\frac{3}{2}$
 (4) $\frac{5}{3}$

133. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m^{-1} . The permeability of the material of the rod is :

- ($\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1}$)
 (1) $2.4\pi \times 10^{-4} \text{ T m A}^{-1}$
 (2) $8.0 \times 10^{-5} \text{ T m A}^{-1}$
 (3) $2.4\pi \times 10^{-5} \text{ T m A}^{-1}$
 (4) $2.4\pi \times 10^{-7} \text{ T m A}^{-1}$

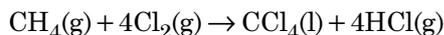
134. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

- (1) $3.66 \times 10^{-7} \text{ rad}$
 (2) $1.83 \times 10^{-7} \text{ rad}$
 (3) $7.32 \times 10^{-7} \text{ rad}$
 (4) $6.00 \times 10^{-7} \text{ rad}$

135. The increase in the width of the depletion region in a p-n junction diode is due to :

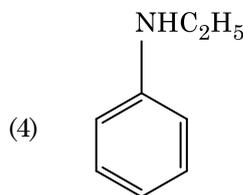
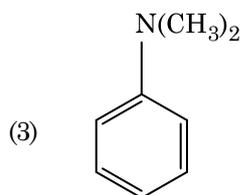
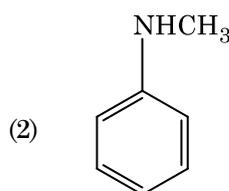
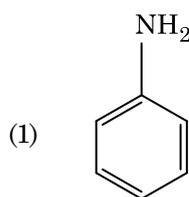
- (1) forward bias only
 (2) reverse bias only
 (3) both forward bias and reverse bias
 (4) increase in forward current

136. 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

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

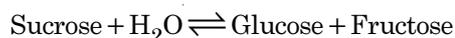


138. The mixture which shows positive deviation from Raoult's law is :

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

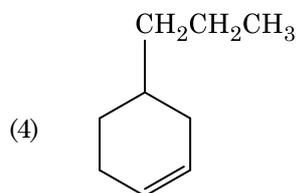
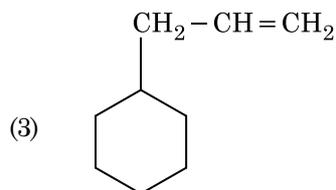
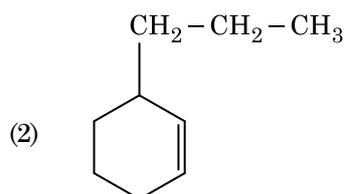
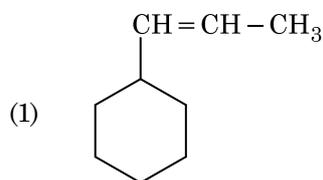
139. An increase in the concentration of the reactants of a reaction leads to change in :
- (1) activation energy
 - (2) heat of reaction
 - (3) threshold energy
 - (4) collision frequency
140. Sucrose on hydrolysis gives :
- (1) β -D-Glucose + α -D-Fructose
 - (2) α -D-Glucose + β -D-Glucose
 - (3) α -D-Glucose + β -D-Fructose
 - (4) α -D-Fructose + β -D-Fructose
141. A tertiary butyl carbocation is more stable than a secondary butyl carbocation because of which of the following ?
- (1) -I effect of $-\text{CH}_3$ groups
 - (2) +R effect of $-\text{CH}_3$ groups
 - (3) -R effect of $-\text{CH}_3$ groups
 - (4) Hyperconjugation
142. Identify the **correct** statement from the following :
- (1) Wrought iron is impure iron with 4% carbon.
 - (2) Blister copper has blistered appearance due to evolution of CO_2 .
 - (3) Vapour phase refining is carried out for Nickel by Van Arkel method.
 - (4) Pig iron can be moulded into a variety of shapes.
143. Identify the **incorrect** match.
- | Name | IUPAC Official Name |
|-----------------|---------------------|
| (a) Unnilunium | (i) Mendeleevium |
| (b) Unniltrium | (ii) Lawrencium |
| (c) Unnilhexium | (iii) Seaborgium |
| (d) Unununnium | (iv) Darmstadtium |
- (1) (a), (i)
 - (2) (b), (ii)
 - (3) (c), (iii)
 - (4) (d), (iv)
144. 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) 1
 - (2) 2
 - (3) 3
 - (4) 4
145. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :
- (1) $\frac{\sqrt{3}}{4} \times 288 \text{ pm}$
 - (2) $\frac{\sqrt{2}}{4} \times 288 \text{ pm}$
 - (3) $\frac{4}{\sqrt{3}} \times 288 \text{ pm}$
 - (4) $\frac{4}{\sqrt{2}} \times 288 \text{ pm}$
146. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :
- (1) Aldol condensation
 - (2) Cannizzaro's reaction
 - (3) Cross Cannizzaro's reaction
 - (4) Cross Aldol condensation
147. 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) $2 \times 10^{-13} \text{ M}$
 - (2) $2 \times 10^{-8} \text{ M}$
 - (3) $1 \times 10^{-13} \text{ M}$
 - (4) $1 \times 10^8 \text{ M}$
148. 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 $\Delta_r S < 0$
149. Which of the following is a basic amino acid ?
- (1) Serine
 - (2) Alanine
 - (3) Tyrosine
 - (4) Lysine

150. 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 $\Delta_r G^\ominus$ at the same temperature will be :

- (1) $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$
 (2) $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$
 (3) $8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(3 \times 10^{13})$
 (4) $-8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} \times \ln(4 \times 10^{13})$
151. An alkene on ozonolysis gives methanal as one of the product. Its structure is :



152. 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) 9 bar
 (2) 12 bar
 (3) 15 bar
 (4) 18 bar

153. Match the following and identify the correct option.

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

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

154. 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) Iron
 (2) Copper
 (3) Calcium
 (4) Potassium

155. Match the following :

	Oxide		Nature
(a)	CO	(i)	Basic
(b)	BaO	(ii)	Neutral
(c)	Al_2O_3	(iii)	Acidic
(d)	Cl_2O_7	(iv)	Amphoteric

Which of the following is correct option ?

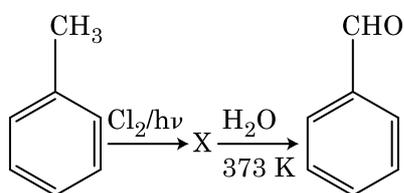
	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

156. Elimination reaction of 2-Bromo-pentane to form pent-2-ene is :
- β -Elimination reaction
 - Follows Zaitsev rule
 - Dehydrohalogenation reaction
 - Dehydration reaction
- (a), (b), (c)
 - (a), (c), (d)
 - (b), (c), (d)
 - (a), (b), (d)
157. Paper chromatography is an example of :
- Adsorption chromatography
 - Partition chromatography
 - Thin layer chromatography
 - Column chromatography
158. The correct option for free expansion of an ideal gas under adiabatic condition is :
- $q = 0, \Delta T = 0$ and $w = 0$
 - $q = 0, \Delta T < 0$ and $w > 0$
 - $q < 0, \Delta T = 0$ and $w = 0$
 - $q > 0, \Delta T > 0$ and $w > 0$
159. Which of the following set of molecules will have zero dipole moment ?
- Ammonia, beryllium difluoride, water, 1,4-dichlorobenzene
 - Boron trifluoride, hydrogen fluoride, carbon dioxide, 1,3-dichlorobenzene
 - Nitrogen trifluoride, beryllium difluoride, water, 1,3-dichlorobenzene
 - Boron trifluoride, beryllium difluoride, carbon dioxide, 1,4-dichlorobenzene
160. The number of protons, neutrons and electrons in ${}_{71}^{175}\text{Lu}$, respectively, are :
- 71, 104 and 71
 - 104, 71 and 71
 - 71, 71 and 104
 - 175, 104 and 71
161. On electrolysis of dil. sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be :
- Hydrogen gas
 - Oxygen gas
 - H_2S gas
 - SO_2 gas
162. Identify the **correct** statements from the following :
- $\text{CO}_2(\text{g})$ is used as refrigerant for ice-cream and frozen food.
 - The structure of C_{60} contains twelve six carbon rings and twenty five carbon rings.
 - ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.
 - CO is colorless and odourless gas.
- (a), (b) and (c) only
 - (a) and (c) only
 - (b) and (c) only
 - (c) and (d) only

163. Urea reacts with water to form **A** which will decompose to form **B**. **B** when passed through Cu^{2+} (aq), deep blue colour solution **C** is formed. What is the formula of **C** from the following ?

- (1) CuSO_4
- (2) $[\text{Cu}(\text{NH}_3)_4]^{2+}$
- (3) $\text{Cu}(\text{OH})_2$
- (4) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$

164. Identify compound X in the following sequence of reactions :



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

165. Anisole on cleavage with HI gives :

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

166. The freezing point depression constant (K_f) of benzene is $5.12 \text{ K kg mol}^{-1}$. 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) 0.20 K
- (2) 0.80 K
- (3) 0.40 K
- (4) 0.60 K

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

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

168. 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) 100 s
- (2) 200 s
- (3) 500 s
- (4) 1000 s

169. HCl was passed through a solution of CaCl_2 , MgCl_2 and NaCl . Which of the following compound(s) crystallise(s) ?
- (1) Both MgCl_2 and CaCl_2
 - (2) Only NaCl
 - (3) Only MgCl_2
 - (4) NaCl , MgCl_2 and CaCl_2
170. Which of the following oxoacid of sulphur has $-\text{O}-\text{O}-$ linkage ?
- (1) H_2SO_3 , sulphurous acid
 - (2) H_2SO_4 , sulphuric acid
 - (3) $\text{H}_2\text{S}_2\text{O}_8$, peroxodisulphuric acid
 - (4) $\text{H}_2\text{S}_2\text{O}_7$, pyrosulphuric acid
171. Which of the following is a natural polymer ?
- (1) *cis*-1,4-polyisoprene
 - (2) poly (Butadiene-styrene)
 - (3) polybutadiene
 - (4) poly (Butadiene-acrylonitrile)
172. Identify a molecule which does **not** exist.
- (1) He_2
 - (2) Li_2
 - (3) C_2
 - (4) O_2
173. Measuring Zeta potential is useful in determining which property of colloidal solution ?
- (1) Viscosity
 - (2) Solubility
 - (3) Stability of the colloidal particles
 - (4) Size of the colloidal particles
174. The calculated spin only magnetic moment of Cr^{2+} ion is :
- (1) 3.87 BM
 - (2) 4.90 BM
 - (3) 5.92 BM
 - (4) 2.84 BM
175. Which of the following alkane cannot be made in good yield by Wurtz reaction ?
- (1) n-Hexane
 - (2) 2,3-Dimethylbutane
 - (3) n-Heptane
 - (4) n-Butane
176. Which one of the followings has maximum number of atoms ?
- (1) 1 g of Ag(s) [Atomic mass of $\text{Ag} = 108$]
 - (2) 1 g of Mg(s) [Atomic mass of $\text{Mg} = 24$]
 - (3) 1 g of $\text{O}_2(\text{g})$ [Atomic mass of $\text{O} = 16$]
 - (4) 1 g of Li(s) [Atomic mass of $\text{Li} = 7$]
177. Identify the **incorrect** statement.
- (1) $\text{Cr}^{2+}(\text{d}^4)$ is a stronger reducing agent than $\text{Fe}^{2+}(\text{d}^6)$ in water.
 - (2) The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes.
 - (3) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.
 - (4) The oxidation states of chromium in CrO_4^{2-} and $\text{Cr}_2\text{O}_7^{2-}$ are not the same.
178. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?
- (1) $\text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
 - (2) $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{C}_2\text{O}_4^{2-}$
 - (3) $\text{F}^- < \text{SCN}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
 - (4) $\text{CN}^- < \text{C}_2\text{O}_4^{2-} < \text{SCN}^- < \text{F}^-$
179. Which of the following is a cationic detergent ?
- (1) Sodium lauryl sulphate
 - (2) Sodium stearate
 - (3) Cetyltrimethyl ammonium bromide
 - (4) Sodium dodecylbenzene sulphonate
180. Which of the following is **not** correct about carbon monoxide ?
- (1) It forms carboxyhaemoglobin.
 - (2) It reduces oxygen carrying ability of blood.
 - (3) The carboxyhaemoglobin (haemoglobin bound to CO) is less stable than oxyhaemoglobin.
 - (4) It is produced due to incomplete combustion.