

129. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :

- (1) 50 cm
 (2) 67 cm
 (3) 80 cm
 (4) 33 cm
130. The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

- (1) $\frac{3\pi}{2}$ rad
 (2) $\frac{\pi}{2}$ rad
 (3) zero
 (4) π rad

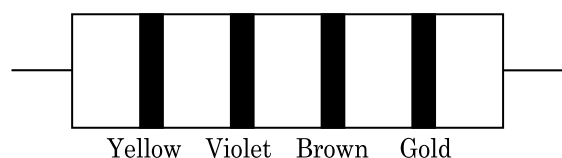
131. The Brewsters angle i_b for an interface should be :

- (1) $30^\circ < i_b < 45^\circ$
 (2) $45^\circ < i_b < 90^\circ$
 (3) $i_b = 90^\circ$
 (4) $0^\circ < i_b < 30^\circ$

132. Dimensions of stress are :

- (1) $[ML^2T^{-2}]$
 (2) $[ML^0T^{-2}]$
 (3) $[ML^{-1}T^{-2}]$
 (4) $[MLT^{-2}]$

133. The color code of a resistance is given below :



The values of resistance and tolerance, respectively, are :

- (1) 47 k Ω , 10%
 (2) 4.7 k Ω , 5%
 (3) 470 Ω , 5%
 (4) 470 k Ω , 5%
134. A spherical conductor of radius 10 cm has a charge of 3.2×10^{-7} C distributed uniformly. What is the magnitude of electric field at a point 15 cm from the centre of the sphere ?

$$\left(\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right)$$

- (1) 1.28×10^5 N/C
 (2) 1.28×10^6 N/C
 (3) 1.28×10^7 N/C
 (4) 1.28×10^4 N/C

135. Find the torque about the origin when a force of $3\hat{j}$ N acts on a particle whose position vector is $2\hat{k}$ m .

- (1) $6\hat{j}$ N m
 (2) $-6\hat{i}$ N m
 (3) $6\hat{k}$ N m
 (4) $6\hat{i}$ N m

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

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

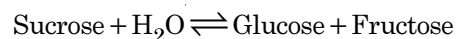
137. Which of the following is **not** correct about carbon monoxide ?

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

138. 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) 2
 (2) 3
 (3) 4
 (4) 1

139. 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) $8.314 \text{ J mol}^{-1}\text{K}^{-1} \times 300 \text{ K} \times \ln(3 \times 10^{13})$
 (3) $-8.314 \text{ J mol}^{-1}\text{K}^{-1} \times 300 \text{ K} \times \ln(4 \times 10^{13})$
 (4) $-8.314 \text{ J mol}^{-1}\text{K}^{-1} \times 300 \text{ K} \times \ln(2 \times 10^{13})$

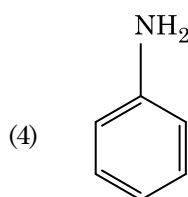
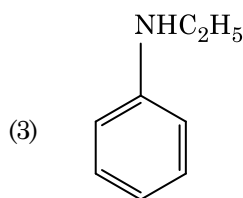
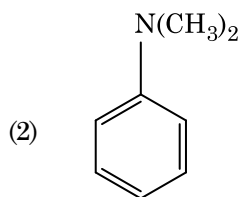
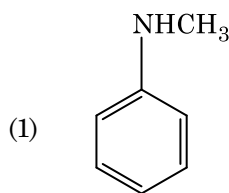
140. For the reaction, $2\text{Cl}(\text{g}) \rightarrow \text{Cl}_2(\text{g})$, the **correct** option is :

- (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 $\Delta_r S > 0$

141. Paper chromatography is an example of :
 (1) Partition chromatography
 (2) Thin layer chromatography
 (3) Column chromatography
 (4) Adsorption chromatography
142. 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) 200 s
 (2) 500 s
 (3) 1000 s
 (4) 100 s
143. Which of the following oxoacid of sulphur has –O–O– linkage ?
 (1) H_2SO_4 , sulphuric acid
 (2) $\text{H}_2\text{S}_2\text{O}_8$, peroxodisulphuric acid
 (3) $\text{H}_2\text{S}_2\text{O}_7$, pyrosulphuric acid
 (4) H_2SO_3 , sulphurous acid
144. Reaction between benzaldehyde and acetophenone in presence of dilute NaOH is known as :
 (1) Cannizzaro's reaction
 (2) Cross Cannizzaro's reaction
 (3) Cross Aldol condensation
 (4) Aldol condensation
145. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is :
 (1) $\frac{\sqrt{2}}{4} \times 288 \text{ pm}$
 (2) $\frac{4}{\sqrt{3}} \times 288 \text{ pm}$
 (3) $\frac{4}{\sqrt{2}} \times 288 \text{ pm}$
 (4) $\frac{\sqrt{3}}{4} \times 288 \text{ pm}$
146. Which of the following is a cationic detergent ?
 (1) Sodium stearate
 (2) Cetyltrimethyl ammonium bromide
 (3) Sodium dodecylbenzene sulphonate
 (4) Sodium lauryl sulphate
147. The calculated spin only magnetic moment of Cr^{2+} ion is :
 (1) 4.90 BM
 (2) 5.92 BM
 (3) 2.84 BM
 (4) 3.87 BM
148. HCl was passed through a solution of CaCl_2 , MgCl_2 and NaCl. Which of the following compound(s) crystallise(s) ?
 (1) Only NaCl
 (2) Only MgCl_2
 (3) NaCl, MgCl_2 and CaCl_2
 (4) Both MgCl_2 and CaCl_2
149. Match the following and identify the **correct** option.
- | | |
|---|---|
| (a) $\text{CO(g)} + \text{H}_2\text{(g)}$ | (i) $\text{Mg}(\text{HCO}_3)_2 + \text{Ca}(\text{HCO}_3)_2$ |
| (b) Temporary hardness of water | (ii) An electron deficient hydride |
| (c) B_2H_6 | (iii) Synthesis gas |
| (d) H_2O_2 | (iv) Non-planar structure |
- | | (a) | (b) | (c) | (d) |
|-----|-------|-------|------|------|
| (1) | (iii) | (ii) | (i) | (iv) |
| (2) | (iii) | (iv) | (ii) | (i) |
| (3) | (i) | (iii) | (ii) | (iv) |
| (4) | (iii) | (i) | (ii) | (iv) |
150. 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) (a), (c), (d)
 (2) (b), (c), (d)
 (3) (a), (b), (d)
 (4) (a), (b), (c)
151. Which of the following is the **correct** order of increasing field strength of ligands to form coordination compounds ?
 (1) $\text{SCN}^- < \text{F}^- < \text{CN}^- < \text{C}_2\text{O}_4^{2-}$
 (2) $\text{F}^- < \text{SCN}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
 (3) $\text{CN}^- < \text{C}_2\text{O}_4^{2-} < \text{SCN}^- < \text{F}^-$
 (4) $\text{SCN}^- < \text{F}^- < \text{C}_2\text{O}_4^{2-} < \text{CN}^-$
152. Identify the **correct** statement from the following :
 (1) Blister copper has blistered appearance due to evolution of CO_2 .
 (2) Vapour phase refining is carried out for Nickel by Van Arkel method.
 (3) Pig iron can be moulded into a variety of shapes.
 (4) Wrought iron is impure iron with 4% carbon.

153. Sucrose on hydrolysis gives :
- (1) α -D-Glucose + β -D-Glucose
 - (2) α -D-Glucose + β -D-Fructose
 - (3) α -D-Fructose + β -D-Fructose
 - (4) β -D-Glucose + α -D-Fructose
154. What is the change in oxidation number of carbon in the following reaction ?
- $$\text{CH}_4(\text{g}) + 4\text{Cl}_2(\text{g}) \rightarrow \text{CCl}_4(\text{l}) + 4\text{HCl}(\text{g})$$
- (1) 0 to +4
 - (2) -4 to +4
 - (3) 0 to -4
 - (4) +4 to +4
155. 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) Copper
 - (2) Calcium
 - (3) Potassium
 - (4) Iron
156. Which of the following alkane cannot be made in good yield by Wurtz reaction ?
- (1) 2,3-Dimethylbutane
 - (2) n-Heptane
 - (3) n-Butane
 - (4) n-Hexane
157. Measuring Zeta potential is useful in determining which property of colloidal solution ?
- (1) Solubility
 - (2) Stability of the colloidal particles
 - (3) Size of the colloidal particles
 - (4) Viscosity
158. 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) 0.80 K
 - (2) 0.40 K
 - (3) 0.60 K
 - (4) 0.20 K

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



160. Which of the following is a natural polymer ?

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

161. Identify the **incorrect** statement.

- (1) 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.
- (2) Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.
- (3) The oxidation states of chromium in CrO_4^{2-} and $\text{Cr}_2\text{O}_7^{2-}$ are not the same.
- (4) Cr^{2+} (d^4) is a stronger reducing agent than Fe^{2+} (d^6) in water.

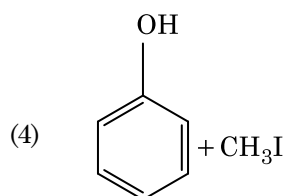
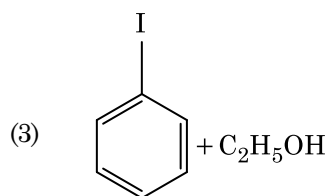
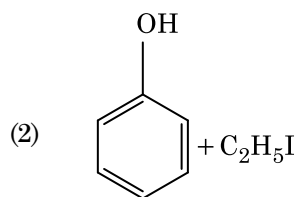
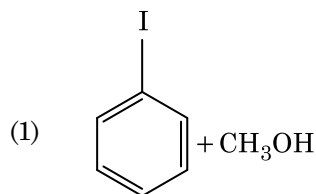
162. Which of the following set of molecules will have zero dipole moment ?

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

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

- (1) Oxygen gas
- (2) H₂S gas
- (3) SO₂ gas
- (4) Hydrogen gas

164. Anisole on cleavage with HI gives :



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

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

166. 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

Which of the following is correct option ?

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

167. 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) - R effect of - CH₃ groups
- (3) Hyperconjugation
- (4) - I effect of - CH₃ groups

168. Which one of the followings has maximum number of atoms ?

- (1) 1 g of Mg(s) [Atomic mass of Mg = 24]
- (2) 1 g of O₂(g) [Atomic mass of O = 16]
- (3) 1 g of Li(s) [Atomic mass of Li = 7]
- (4) 1 g of Ag(s) [Atomic mass of Ag = 108]

169. Which of the following is a basic amino acid ?

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

170. 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 $w = 0$

171. 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) (b), (ii)
- (2) (c), (iii)
- (3) (d), (iv)
- (4) (a), (i)

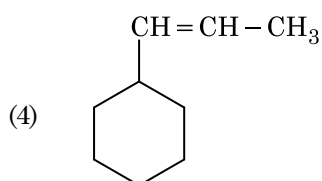
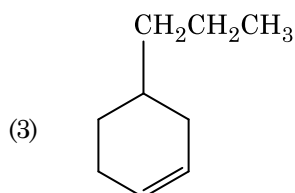
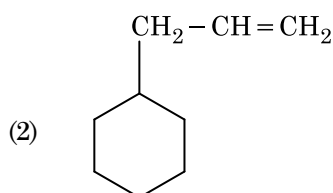
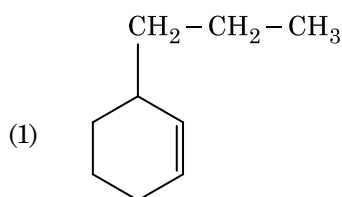
172. Identify a molecule which does **not** exist.

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

173. Identify the **correct** statements from the 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 rings.
 - (c) ZSM-5, a type of zeolite, is used to convert alcohols into gasoline.
 - (d) CO is colorless and odourless gas.
- (1) (a) and (c) only
 - (2) (b) and (c) only
 - (3) (c) and (d) only
 - (4) (a), (b) and (c) only

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



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

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

176. 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) 12 bar
- (2) 15 bar
- (3) 18 bar
- (4) 9 bar

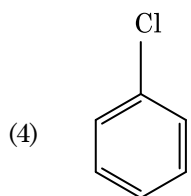
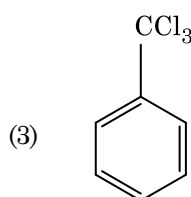
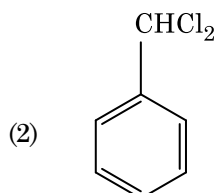
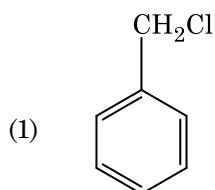
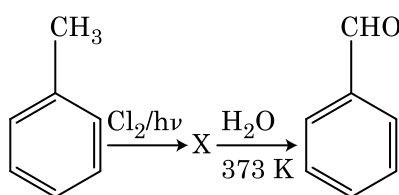
177. An increase in the concentration of the reactants of a reaction leads to change in :

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

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

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

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



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