

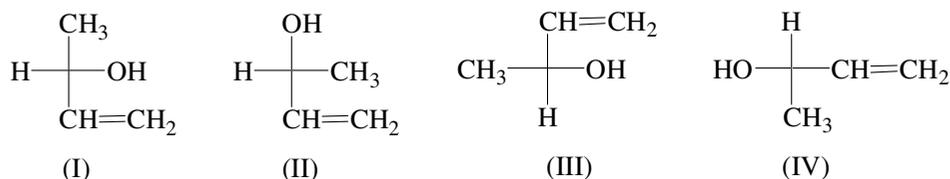
Practice Test Paper–III

Select the Correct Choice

- The compound having +2 as the oxidation state of oxygen is
(a) H_2O_2 (b) CO_2 (c) F_2O (d) MnO_2
- Which of the following is not SI unit of surface tension?
(a) N m^{-1} (b) J m^{-2} (c) kg s^{-2} (d) J m^{-1}
- Which of the following conversions is not correctly represented?
(a) $1 \text{ fm} = 10^{-12} \text{ m}$ (b) $1 \text{ Gm} = 10^9 \text{ m}$ (c) $1 \text{ Em} = 10^{18} \text{ m}$ (d) $1 \text{ nm} = 10^{-9} \text{ m}$
- The ratio $C_{p,m}/C_{v,m}$ for linear triatomic molecules including vibration contribution is given by
(a) 1.667 (b) 1.286 (c) 1.154 (d) 1.167
- The SI unit of viscosity is
(a) $\text{N m}^{-1} \text{ s}$ (b) $\text{N m}^{-2} \text{ s}$ (c) $\text{N m}^{-2} \text{ s}^{-1}$ (d) $\text{N m}^{-1} \text{ s}^{-2}$
- Which of the following statements is not correct?
(a) The orbital $3d_{x^2-y^2}$ has no probability of finding electron along x - and y -axes
(b) The energy of $3d$ orbital may be greater than or less than or equal to that of $4s$ orbital depending upon the atomic number of the atom
(c) In a given electric field, β -particles are deflected more than α -particles in spite of α -particles having larger charge
(d) Pauli exclusion principle is followed by fermions
- Which of the following statements is correct?
(a) Electronegativity is the property of an isolated atom
(b) The third period of periodic table contains 18 elements because third quantum shell includes $3s$, $3p$ and $3d$ orbitals
(c) Inert pair effect refers to the two relatively stable and unreactive outer s electrons
(d) The first and second ionization energies of nitrogen are greater than those of oxygen
- Which of the following resonating structures for CO_2 is not correctly represented?
(a) $\text{:}\ddot{\text{O}}=\text{C}=\ddot{\text{O}}\text{:}$ (b) $\text{:}\ddot{\text{O}}-\text{C}\equiv\text{O}\text{:}^+$ (c) $^+\text{:}\ddot{\text{O}}-\text{C}=\ddot{\text{O}}\text{:}^-$ (d) $^+\text{:}\text{O}-\text{C}\equiv\ddot{\text{O}}\text{:}^-$
- Which of the following substances does not crystallise in the rock-salt structure?
(a) NaCl (b) KCl (c) MgO (d) CsCl
- The freezing point depression of $0.110 \text{ mol kg}^{-1}$ aqueous solution of formic acid is -0.21°C . If $K_f(\text{water})$ is $1.86 \text{ K kg mol}^{-1}$, the degree of dissociation of formic acid in the solution would be
(a) 0.0132 (b) 0.0264 (c) 0.0396 (d) 0.0528
- The enthalpy of hydrogenation of a double bond is -119 kJ mol^{-1} . If the enthalpy of reaction cyclohexane \rightarrow benzene is 205 kJ mol^{-1} , the resonance energy of benzene will be
(a) -152 kJ mol^{-1} (b) -172 kJ mol^{-1} (c) 152 kJ mol^{-1} (d) 172 kJ mol^{-1}
- Which of the following statements regarding the solubility of zinc hydroxide is true as the pH of the solution is increased?
(a) continuous increase (b) continuous decrease
(c) firstly decreases followed by an increase (d) firstly increases followed by a decrease
- A dilute aqueous solution of Na_2SO_4 is electrolysed using platinum electrodes. The products at the anode and cathode are
(a) O_2, H_2 (b) $\text{S}_2\text{O}_8^{2-}, \text{Na}$ (c) O_2, Na (d) H_2, O_2

III.2 Complete Chemistry—JEE Main

14. Which of the following statements is correct?
 (a) The half-life period of a reaction is independent of temperature
 (b) A catalyst decreases the enthalpy change of a chemical reaction
 (c) Truly speaking, the acid hydrolysis of an ester is a third order reaction
 (d) A first-order reaction reaches the completion stage in a finite interval of time
15. Which of the following combinations amongst the four Fischer projections represents the same absolute configurations?



- (a) (II) and (III) (b) (I) and (IV) (c) (II) and (IV) (d) (III) and (IV)
16. Which of the following compounds is expected to have maximum enol content in ethanol?
 (a) $\text{CH}_3\text{COCH}_2\text{CO}_2\text{CH}_3$ (b) $\text{CH}_3\text{COCH}_2\text{CO}_2\text{C}_2\text{H}_5$ (c) $\text{CH}_3\text{COCH}_2\text{COCH}_3$ (d) $\text{CH}_3\text{COCH}(\text{CH}_3)\text{COCH}_3$
17. Which of the following orders of reactivity of acid derivatives towards a nucleophile is correct?
 (a) acid chloride > anhydride > ester (b) acid chloride < anhydride < ester
 (c) acid chloride > ester > anhydride (d) anhydride > acid chloride > ester
18. Which of the following dicarboxylic acids gives cyclic ketone on heating?
 (a) $\text{CH}_2(\text{COOH})_2$ (b) $(\text{CH}_2\text{COOH})_2$ (c) $\text{HOOC}(\text{CH}_2)_3\text{COOH}$ (d) $\text{HOOC}(\text{CH}_2)_4\text{COOH}$
19. The correct order of base strength of the following amines is
 (a) *o*-nitroaniline > *p*-nitroaniline > *m*-nitroaniline (b) *m*-nitroaniline > *p*-nitroaniline > *o*-nitroaniline
 (c) *m*-nitroaniline > *o*-nitroaniline > *p*-nitroaniline (d) *o*-nitroaniline > *m*-nitroaniline > *p*-nitroaniline
20. In alkaline medium, fructose is
 (a) a reducing sugar (b) a nonreducing sugar (c) an aldose (d) a furanose
21. Which of the following is an essential amino acid?
 (a) Glycine (b) Proline (c) Cysteine (d) Lysine
22. Which of the following polymers contains ester linkages?
 (a) Terylene (b) Nylon-66 (c) Bakelite (d) Styron
23. Which of the following dyes belongs to mordant dye?
 (a) Indigo (b) Alizarin (c) Martius yellow (d) Phenolphthalein
24. Which of the following statements is correct?
 (a) Red phosphorus is less volatile than white phosphorus
 (b) Silicon does not form $\text{Si}=\text{O}$ double bonds
 (c) Ozone is a linear molecule
 (d) The structure of $\text{N}(\text{SiH}_3)_3$ is pyramidal
25. Which of the following statements is correct?
 (a) Anhydrous MgCl_2 is obtained by heating $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$
 (b) PbO_2 on reacting with dilute acid produces hydrogen peroxide
 (c) Silver fluoride is fairly soluble in water
 (d) Burning of sodium in air produces sodium monoxide
26. Which of the following statements is not correct?
 (a) Silver nitrate gives white precipitate with concentrated solution of sodium thiosulphate
 (b) A current of chlorine displaces bromide from silver bromide
 (c) Tin(II) chloride is a reducing agent
 (d) Ferric chlorides exists as a dimer in gaseous phase.
27. Which of the following statements is not correct for hypophosphoric acid?
 (a) It is formed when white phosphorus partially immersed in water is allowed to oxidize in a limited supply of air
 (b) It is a tribasic acid
 (c) It has no reducing characteristics
 (d) In warm water it undergoes hydrolysis producing phosphorous acid and phosphoric acid

28. Which of the following statements is correct?
 (a) Both potassium ferrocyanide and potassium ferricyanide are diamagnetic
 (b) Both potassium ferrocyanide and potassium ferricyanide are paramagnetic
 (c) Potassium ferrocyanide is paramagnetic while potassium ferricyanide is diamagnetic
 (d) Potassium ferrocyanide is diamagnetic while potassium ferricyanide is paramagnetic
29. Which of the following is epsom salt?
 (a) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (b) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ (c) ZnSO_4 (d) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
30. The compound $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ can form
 (a) geometrical isomers (b) coordination isomers (c) linkage isomers (d) optical isomers



ANSWERS

- | | | | | | |
|---------|---------|---------|---------|---------|---------|
| 1. (c) | 2. (d) | 3. (a) | 4. (c) | 5. (b) | 6. (a) |
| 7. (c) | 8. (c) | 9. (d) | 10. (b) | 11. (a) | 12. (c) |
| 13. (a) | 14. (c) | 15. (c) | 16. (c) | 17. (a) | 18. (d) |
| 19. (b) | 20. (a) | 21. (d) | 22. (a) | 23. (b) | 24. (b) |
| 25. (c) | 26. (a) | 27. (b) | 28. (d) | 29. (b) | 30. (a) |



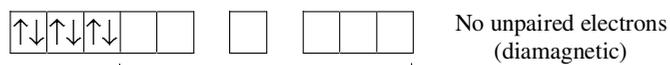
HINTS AND SOLUTIONS

1. Fluorine is more electronegative than oxygen.
 3. $1 \text{ fm} = 10^{-15} \text{ m}$
 4. For a triatomic molecule
- $$C_{V,m} = \frac{3}{2}R + R + 4R = \frac{13}{2}R; \quad C_{p,m} = \frac{13}{2}R + R = \frac{15}{2}R$$
- Hence, $C_{p,m}/C_{V,m} = 15/13 = 1.154$
8. The structure $:\ddot{\text{O}}-\text{C}=\ddot{\text{O}}:-$ is not consistent with the charges and number of electrons possessed by the atoms.
 9. CsCl crystallizes in body-centred cubic lattice.
 10. $\text{HCOOH} \rightleftharpoons \text{HCOO}^- + \text{H}^+$
 $m(1 - \alpha) \quad m\alpha \quad m\alpha \quad \text{Total molality} = m(1 + \alpha)$
 Hence, $m(1 + \alpha)K_f = \Delta T_f$. Thus
- $$\alpha = \frac{\Delta T_f}{mK_f} - 1 = \frac{0.21 \text{ K}}{(0.110 \text{ mol kg}^{-1})(1.86 \text{ kg mol}^{-1})} - 1 = 0.0264$$
11. The resonance energy is $-3(119 \text{ kJ mol}^{-1}) + 205 \text{ kJ mol}^{-1} = -152 \text{ kJ mol}^{-1}$.
 12. $\text{Zn}(\text{OH})_2$ is amphoteric. Its solubility is more both in acidic and alkaline solution.
 14. The acid hydrolysis of an ester follows the rate law $r = k[\text{ester}][\text{H}^+][\text{H}_2\text{O}]$
 15. The Fischer projection may be moved in the following ways without changing the meaning of the projection.
 (i) Rotating the Fischer projection by 180°
 (ii) Hold any group steady and rotate the other three in either a clockwise or a counter clockwise direction.
 The projection (iv) can be converted into the projection (ii) by carrying out the second operation (listed above) twice.
 24. Silicon forms $-\text{O}-\text{Si}-\text{O}-\text{Si}-$ linkages. It does not form $p\pi-p\pi$ double bonds with oxygen due to its large size which prevents effective overlap between $2p(\text{Si})$ and $2p(\text{O})$ orbitals.
 25. Solubility of silver halides decreases in the order $\text{AgF} > \text{AgCl} > \text{AgBr} > \text{AgI}$
 26. Silver nitrate gives eventually black precipitates with sodium thiosulphate.

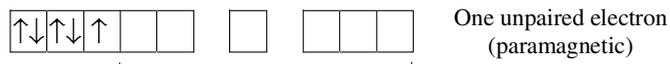
PIII.4 Complete Chemistry—JEE Main

27. Hypophosphoric acid is $\begin{array}{c} \text{OH} \quad \text{OH} \\ | \quad | \\ \text{O}=\text{P}-\text{P}=\text{O} \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$. So, it is tetrabasic acid.

28. The electronic configurations of Fe(II) and Fe(III) in $\text{Fe}(\text{CN})_6^{4-}$ and $\text{Fe}(\text{CN})_6^{3-}$ respectively are



d^2sp^3 hybridization



d^2sp^3 hybridization