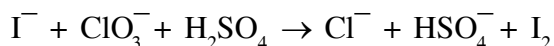


PART - II : CHEMISTRY

SECTION-1 : (One or More Than One Options Correct Type)

This section contains **10 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE or MORE THAN ONE** are correct.

21. For the reaction



The correct statement(s) in the balanced equation is / are :

- (A) Stoichiometric coefficient of HSO_4^- is 6
- (B) Iodide is oxidized
- (C) Sulphur is reduced
- (D) H_2O is one of the products

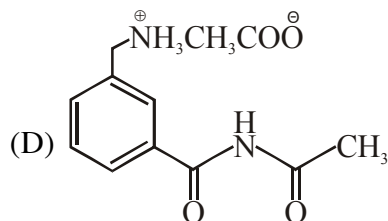
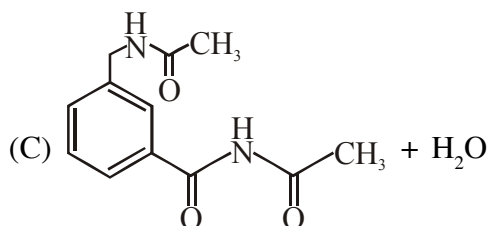
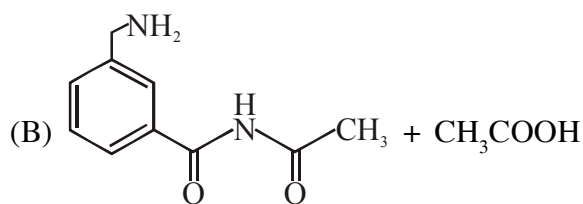
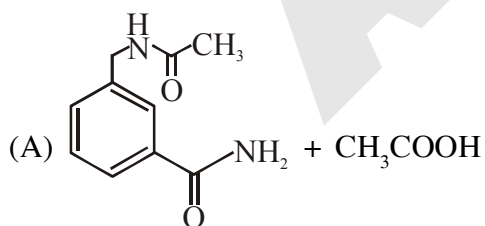
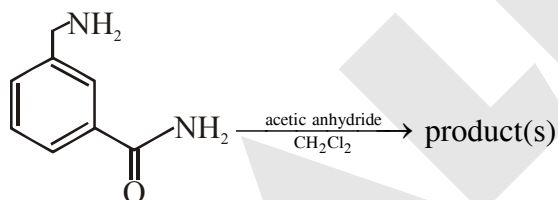
Ans. (A,B,D)

22. The pair(s) of reagents that yield paramagnetic species is / are :

- (A) Na and excess of NH_3
- (B) K and excess of O_2
- (C) Cu and dilute HNO_3
- (D) O_2 and 2-ethylantraquinol

Ans. (A,B,C) / (B,C)

23. In the reaction shown below, the major product(s) formed is / are :



Ans. (A)

24. In a galvanic cell, the salt bridge -
- (A) Does not participate chemically in the cell reaction
 - (B) Stops the diffusion of ions from one electrode to another
 - (C) Is necessary for the occurrence of the cell reaction
 - (D) Ensures mixing of the two electrolytic solutions

Ans. (A,B)

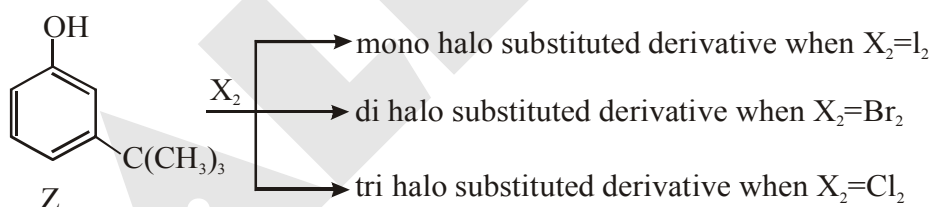
25. Upon heating with Cu_2S , the reagent(s) that give copper metal is/are
- (A) CuFeS_2
 - (B) CuO
 - (C) Cu_2O
 - (D) CuSO_4

Ans. (C)

26. Hydrogen bonding plays a central role in the following phenomena
- (A) Ice floats in water
 - (B) Higher Lewis basicity of primary amines than tertiary amines in aqueous solutions
 - (C) Formic acid is more acidic than acetic acid
 - (D) Dimerisation of acetic acid in benzene

Ans. (A,B,D)

27. The reactivity of compound Z with different halogens under appropriate conditions is given below-



The observed pattern of electrophilic substitution can be explained by -

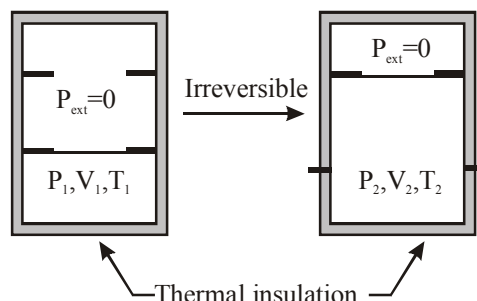
- (A) The steric effect of the halogen
- (B) The steric effect of the tert-butyl group
- (C) The electronic effect of the phenolic group
- (D) The electronic effect of the tert-butyl group

Ans. (A,B,C)

28. The correct combination of names for isomeric alcohols with molecular formula $\text{C}_4\text{H}_{10}\text{O}$ is/are-
- (A) *tert*-butanol and 2-methylpropan-2-ol
 - (B) *tert*-butanol and 1, 1-dimethylethan-1-ol
 - (C) *n*-butanol and butan-1-ol
 - (D) isobutyl alcohol and 2-methylpropan-1-ol

Ans. (A,B,C,D)

29. An ideal gas in a thermally insulated vessel at internal pressure = P_1 , volume = V_1 and absolute temperature = T_1 expands irreversibly against zero external pressure, as shown in the diagram. The final internal pressure, volume and absolute temperature of the gas are P_2 , V_2 and T_2 , respectively. For this expansion,



- (A) $q = 0$ (B) $T_2 = T_1$ (C) $P_2 V_2 = P_1 V_1$ (D) $P_2 V_2^\gamma = P_1 V_1^\gamma$

Ans. (A,B,C)

30. The correct statement(s) for orthoboric acid is/are-

- (A) It behaves as a weak acid in water due to self ionization
(B) Acidity of its aqueous solution increases upon addition of ethylene glycol
(C) It has a three dimensional structure due to hydrogen bonding.
(D) It is a weak electrolyte in water

Ans. (D)

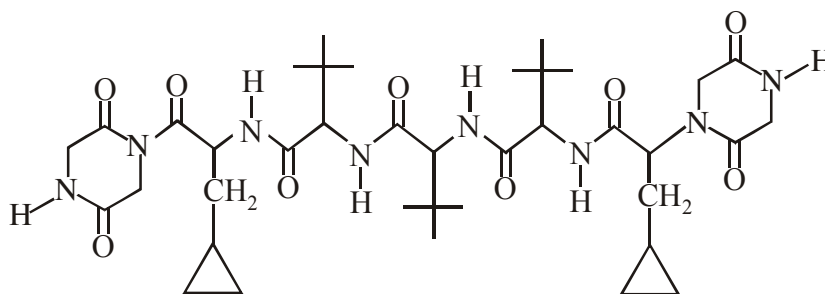
SECTION-2 : (One Integer Value Correct Type)

This section contains **10 questions**. Each question, when worked out will result in one integer from 0 to 9 (both inclusive).

31. In an atom, the total number of electrons having quantum numbers $n = 4$, $|m_l| = 1$ and $m_s = -\frac{1}{2}$ is

Ans. (6)

32. The total number of distinct naturally occurring amino acids obtained by complete acidic hydrolysis of the peptide shown below is



Ans. (1)

33. If the value of Avogadro number is $6.023 \times 10^{23} \text{ mol}^{-1}$ and the value of Boltzmann constant is $1.380 \times 10^{-23} \text{ JK}^{-1}$, then the number of significant digits in the calculated value of the universal gas constant is

Ans. (4)

34. A compound H_2X with molar weight of 80 g is dissolved in a solvent having density of 0.4 g mol^{-1} . Assuming no change in volume upon dissolution, the **molality** of a 3.2 molar solution is

Ans. (8)

35. MX_2 dissociates into M^{2+} and X^- ions in an aqueous solution, with a degree of dissociation (α) of 0.5. The ratio of the observed depression of freezing point of the aqueous solution to the value of the depression of freezing point in the absence of ionic dissociation is

Ans. (2)

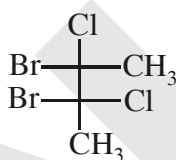
36. Consider the following list of reagents :

Acidified $\text{K}_2\text{Cr}_2\text{O}_7$, alkaline KMnO_4 , CuSO_4 , H_2O_2 , Cl_2 , O_3 , FeCl_3 , HNO_3 and $\text{Na}_2\text{S}_2\text{O}_3$.

The total number of reagents that can oxidise aqueous iodide to iodine is

Ans. (7)

37. The total number(s) of **stable** conformers with **non-zero** dipole moment for the following compound is (are)



Ans. (3)

38. Among PbS , CuS , HgS , MnS , Ag_2S , NiS , CoS , Bi_2S_3 , and SnS_2 the total number of **BLACK** coloured sulphides is

Ans. (6) / (7)

39. Consider all possible isomeric ketones including stereoisomers of $\text{MW} = 100$. All these isomers are independently reacted with NaBH_4 (**NOTE** : stereoisomers are also reacted separately). The total number of ketones that give a racemic product(s) is/are

Ans. (5)

40. A list of species having the formula XZ_4 is given below :

XeF_4 , SF_4 , SiF_4 , BF_4^- , BrF_4^- , $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{FeCl}_4]^{2-}$, $[\text{CoCl}_4]^{2-}$ and $[\text{PtCl}_4]^{2-}$.

Defining shape on the basis of the location of X and Z atoms, the total number of species having a square planar shape is

Ans. (4)