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**Time : 3 Hours****CHEMISTRY****Subject Code**

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**Total No. of Questions : 35 (Printed Pages : 10)****Maximum Marks : 70**

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- INSTRUCTIONS :**
- (i) All questions are compulsory. However question numbers **22, 31, 33, 34** and **35** have internal choice.
  - (ii) Answer each question only once.
  - (iii) For Q. Nos. **1** to **8**, select and write the correct alternative from the options given below the statement.
  - (iv) Q. Nos. **1** to **13** carry *one* mark each.
  - (v) Q. Nos. **14** to **25** carry *two* marks each.
  - (vi) Q. Nos. **26** to **32** carry *three* marks each.
  - (vii) Q. Nos. **33** to **35** carry *four* marks each.
  - (viii) Use of calculator is not permitted; logarithmic tables shall be supplied on request.

1. Concentration of ore by froth floatation method is mainly used for ..... 1

- Hydrated ores
- Sulphide ores
- Oxide ores
- Carbonate ores

2. In a polynucleotide, the linkage which joins two nucleotides is ..... 1

- Glycosidic linkage
- Peptide linkage
- Phosphodiester linkage
- Aminoester linkage

3. The co-ordination number of cobalt in  $[\text{Co}(\text{en})_3]^{3+}$  is ..... 1

- 2
- 3
- 4
- 6

4. A plot of  $\log x/m$  v/s  $\log p$  for adsorption of gas on a solid gives a straight line with slope equal to ..... 1

- $n$
- $\frac{1}{n}$
- $\log k$
- $-\log k$

5. Chlorine containing artificial sweetner which is stable at cooking temperature and has appearance like sugar is ..... 1

- Sucrolose
- Saccharin
- Aspartame
- Alitame

6. A compound formed by elements X and Y crystallizes in a cubic structure in which atoms 'X' are at the corners of the cube and atoms 'Y' are at the face centres. The formula of the compound is ..... 1

- $X_3Y$
- $XY_3$
- $XY_2$
- $X_2Y$

7. When initial concentration of the reactant is doubled, the half-life period of a zero order reaction is ..... 1

- Halved
- Doubled
- Tripled
- Same

8. The geometry of  $\text{XeOF}_4$  is ..... 1
- Square planar
  - Square pyramidal
  - Distorted octahedral
  - Pyramidal
9. Differentiate between fibrous protein and globular protein with respect to its solubility. 1
10. Draw a neat labeled diagram of tetrahedral void. 1
11. What type of detergent is used in toothpastes ? 1
12. Draw a neat labeled diagram for the preparation of metal sols by Bredig's Arc method. 1
13. Complete the following reaction : 1
- $$4 \text{Zn} + 10 \text{HNO}_3 \text{ (dilute)} \longrightarrow ? + ? + 5\text{H}_2\text{O}.$$
14. Write the type of magnetism observed when the magnetic moments are oppositely aligned and cancel out each other. Which stoichiometric defect does not change the density of the crystal ? 2
15. Name the type of deviation and azeotrope shown by a mixture of ethanol and acetone. 2
16. Define coagulation of a colloidal sol.
- Write any *two* methods by which coagulation of lyophobic sols are carried out. 2
17. State Kohlrausch law of independent migration of ions. 2
- Draw a neat labeled diagram of Leclanche cell used in transistors and clocks.
18. Write the names of the monomers used for preparing Nylon 6, 6 polymer. On the basis of molecular forces, identify the class of polymer to which it belongs. 2

19. Draw the open chain structure of D – (+) – Glucose. Write the name of vitamin whose deficiency causes bone deformities in children. 2

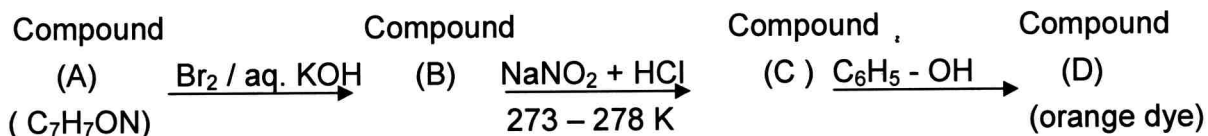
20. Among the following isomeric amines select the one which shows the highest boiling point : 2



Name a reagent which can be used to distinguish between the following pair of compounds :



21. An aromatic compound 'A' with molecular formula  $\text{C}_7\text{H}_7\text{ON}$  undergoes a series of reactions as shown below. Write the structures of A, B, C and D in the following sequence of reactions : 2

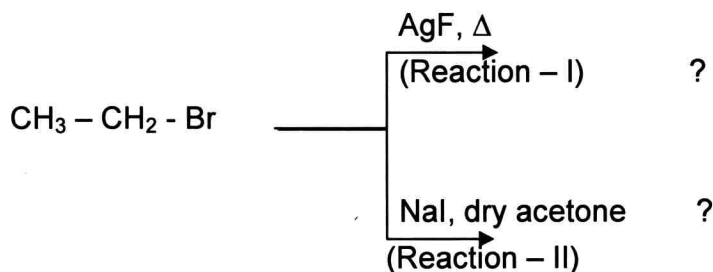


22. What is lanthanoid contraction ? Write the general formula of the oxide formed when lanthanoid burns in oxygen. 2

Or

Write the electronic configuration of Gd ( $Z = 64$ ). Write the general formula of the sulphide formed when lanthanoid is heated with sulphur.

23. Name Reaction-I and Reaction-II and identify the major product formed in these reactions : 2



24. Identify the reagents (i) and (iii) in the following conversions : 2



Which of the products, propanoic acid or  $\alpha$ -Chloropropanoic acid has more acidic character ? State the reason.

25. Compound (X) reacts with magnesium in the presence of dry ether to form a Grignard reagent, which is then treated with compound (Y) containing 3 carbon atoms to form an adduct which on hydrolysis gives 2-methylbutan-2-ol.

Write the chemical reactions involved and name the compounds (X) and (Y). 2

26. Write the balanced chemical equation for the preparation of potassium dichromate from sodium dichromate.

Write any *two* reasons for catalytic properties of transition metals.

Why are  $\text{Zn}^{2+}$  salts colourless while  $\text{Cu}^{2+}$  salts are coloured ? 3

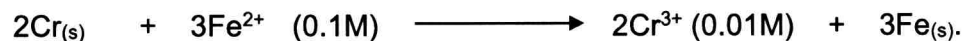
27. Draw structures of geometrical isomers of  $[\text{Fe}(\text{NH}_3)_2(\text{CN})_4]^-$ . 3

Using Valence Bond Theory (VBT), deduce the hybridization of inner orbital complex,  $[\text{Fe}(\text{CN})_6]^{3-}$  and comment on its magnetic property.

28. Why copper spoon cannot be used to stir 1 M  $\text{AgNO}_3$  solution ? 3

Given :  $E^\circ_{\text{Cu}^{2+}|\text{Cu}} = 0.34 \text{ V}$ ,  $E^\circ_{\text{Ag}^+|\text{Ag}} = 0.80 \text{ V}$

Calculate e.m.f. of the cell at 298 K in which following reaction takes place.



Given  $E^\circ_{\text{Cr}^{3+}|\text{Cr}} = -0.74\text{V}$ ,  $E^\circ_{\text{Fe}^{2+}|\text{Fe}} = -0.44\text{V}$

29. Draw a neat labeled diagram of refining method used to obtain semiconductors and other metals of very high purity.

Write the principle of hydraulic washing.

Select the ore amongst the following in which calcination is carried out :

Zinc blende; Iron pyrites; Calamine and Copper pyrites. 3

30. Write IUPAC name of the given compound  $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$   
Out of phenol and ethanol, which one is more acidic ?

Write the preparation of tert-Butyl methyl ether by Williamson synthesis. 3

31. Draw a neat labeled graph to represent the elevation in boiling point of a solution on addition of non-volatile solute to a volatile solvent.

Calculate the molar mass of the substance when 12.5 g of a solute is added to 250 g of water which elevates the boiling point to 0.50 K.

Given :  $K_b$  for water =  $0.52 \text{ K kg mol}^{-1}$ . 3

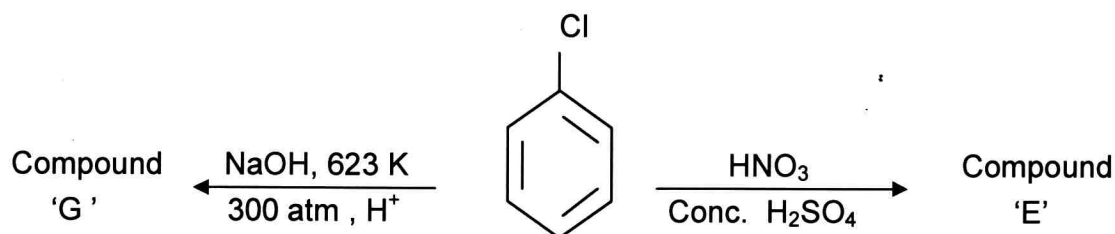
*Or*

Draw a neat labeled diagram of reverse osmosis.

Calculate the osmotic pressure of a solution containing 68.4 g of sucrose (molar mass =  $342 \text{ g mol}^{-1}$ ) in one liter of water at 300 K.

Given :  $R = 0.082 \text{ L atm mol}^{-1} \text{ K}^{-1}$ .

32. In the following reactions, write the name and structure of the major products 'E' and 'G' formed :



What type of configuration is shown by bimolecular nucleophilic substitution ( $S_N2$ ) reaction ? 3

33. Derive an integrated rate equation for a zero order reaction.

The three-fourth of a first order reaction is completed in 30 minutes. Calculate the half-life period of the reaction. 4

*Or*

Write the differential rate equation for the following reaction :



What is the effect of adding a catalyst on activation energy ?

Calculate activation energy if the rate of a chemical reaction doubles for an increase of temperature from 298 K to 308 K. ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ).

34. With respect to group 16 elements write the general trend in ionization enthalpy with reason.

Draw the structure of allotrope of sulphur having  $S_8$  molecule.

A gas 'X' is produced as a byproduct during roasting of iron pyrites. The gas 'X' is also used in the manufacture of sulphuric acid by contact process. Identify gas 'X'.

Write a balanced chemical equation to show action of concentrated sulphuric acid on sucrose. 4



Or

With respect to group 17 elements write the general trend in electron gain enthalpy with reason.

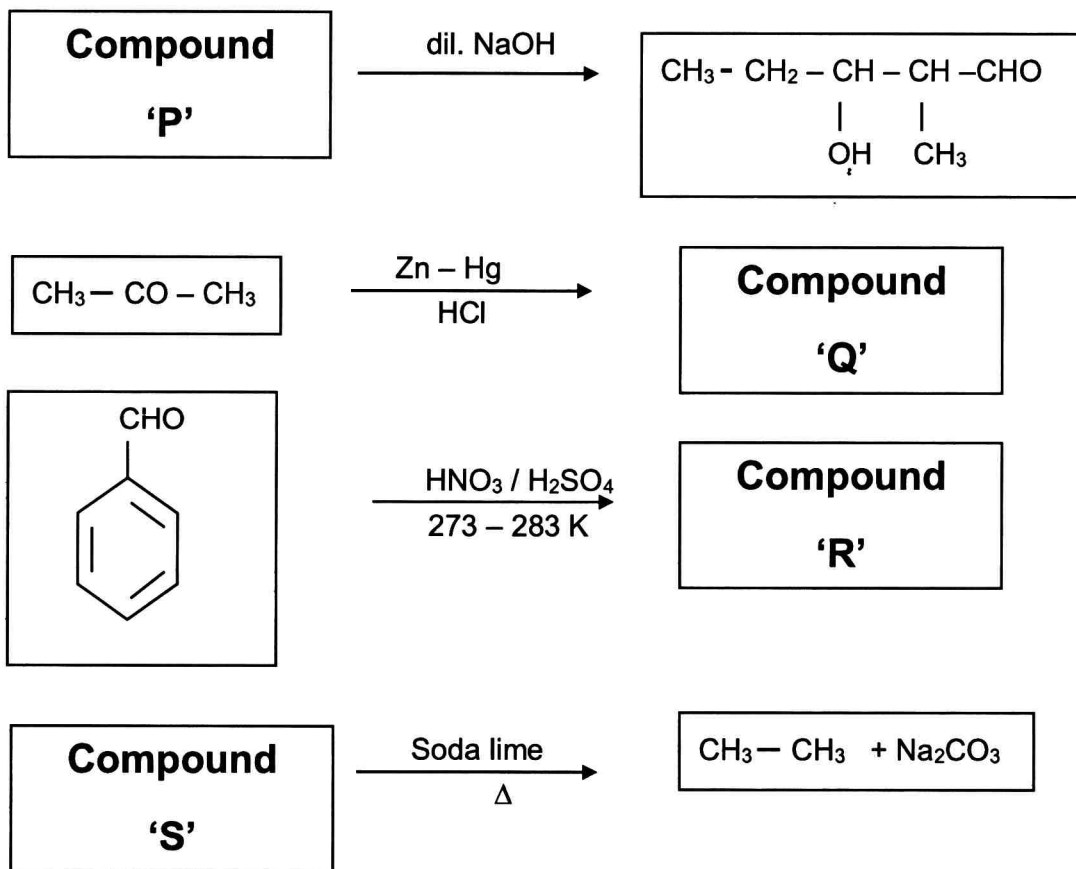
Draw the structure of Chlorous acid.

Chlorine water on standing loses its yellow colour due to formation of HCl and an acid (Y). An acid (Y) gives nascent oxygen which is responsible for oxidising and bleaching action of chlorine. Identify (Y).

Write a balanced chemical equation for preparation of  $\text{ClF}_3$ .

35. Predict the structure and name of the compounds P, Q, R, and S in the following reactions :

4



Or

Predict the structure and name of the compounds K, L, M and N in the following reactions :

