

Answer any 4 questions from 1 to 5. Each carries 1 score.

(4 × 1 = 4)

1. An electrochemical cell can behave like an electrolytic cell when _____

- (a) $E_{\text{cell}} = 0$ (b) $E_{\text{cell}} > E_{\text{ext}}$
(c) $E_{\text{ext}} > E_{\text{cell}}$ (d) $E_{\text{cell}} = E_{\text{ext}}$

2. Which of the following is the unit of rate constant for a first order reaction?

- (a) $\text{L mol}^{-1} \text{s}^{-1}$ (b) s^{-1}
(c) $\text{L}^{-1} \text{mol s}^{-1}$ (d) $\text{L}^2 \text{mol}^{-2} \text{s}^{-1}$

3. Coordination number of copper in $[\text{Cu}(\text{CN})_4]^{3-}$ is 4.

4. Write the name of the poisonous gas formed when chloroform is oxidised by air in the presence of light.

phosgene

phosgene

5. Name the linkage between two monosaccharide units in a disaccharide.

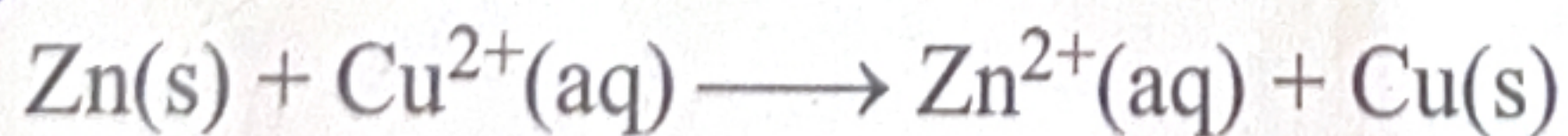
Answer any 8 questions from 6 to 15. Each carries 2 scores.

(8 × 2 = 16)

6. Write any two applications of Henry's law.

pressure cooker
inquiry

7. Calculate the standard emf of the cell in which the following reaction takes place:



$$(E^\circ \text{Cu}^{2+}/\text{Cu} = 0.34 \text{ V} \ \& \ E^\circ \text{Zn}^{2+}/\text{Zn} = -0.76 \text{ V})$$

2.1 V

So cell

= Cathode - Anode

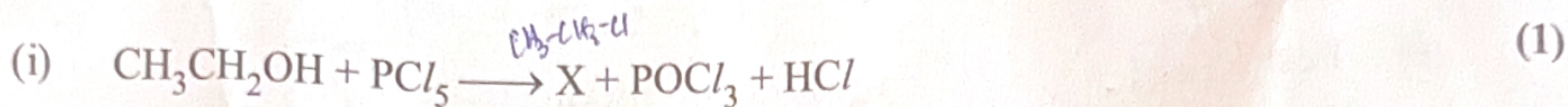
8. Write any two differences between order and molecularity.

same

same molec

9. What is the effect of temperature on the rate constant of a reaction? Write the equation used to determine the effect of temperature on rate constant.

10. Identify the products X and Y formed in the following reactions:



11. The reaction between *tert*-butylbromide and hydroxide ion yields *tert*-butyl alcohol follows $\text{S}_{\text{N}}1$ mechanism. Write the mechanism.

12. Write the name and statement of the law that helps to identify the major product in the β -elimination reactions of haloalkanes. *Saytzeff rule*

13. Give reason for the solubility of alcohols in water. *inhan main H-bond*

14. (i) What is Tollens' reagent? *Silber's reagent* (1)

(ii) Which among CH_3CHO and CH_3COCH_3 form a silver mirror on reaction with Tollens' reagent? (1)

15. Among CH_3NH_2 and $\text{C}_6\text{H}_5\text{NH}_2$, which is more basic? Give reason.

Answer any 8 questions from 16 to 26. Each carries 3 scores. (8 × 3 = 24)

16. Define ideal solutions by citing a suitable example. What are the values of $\Delta_{\text{mix}} H$ and $\Delta_{\text{mix}} V$ for such a solution?

17. (i) Define molar conductivity of a solution. How does it vary with concentration? (2)

(ii) State the law that helps to determine limiting molar conductivity of electrolytes. (1)

18. (i) What is meant by half-life of a reaction?

$$t_{1/2} = \frac{0.693}{k}$$

(ii) A first order reaction is found to have a rate constant, $k = 5.5 \times 10^{-14} \text{ s}^{-1}$. Find the half-life of the reaction.

$$1.26 \times 10^3 \text{ sec}$$

19. (i) Some transition metal ions are given in the box below. Choose the ions which are coloured:

(Z for Sc, Ti and Cr are 21, 22 and 24 respectively)



(ii) Give reason for the formation of coloured ions by transition metals.

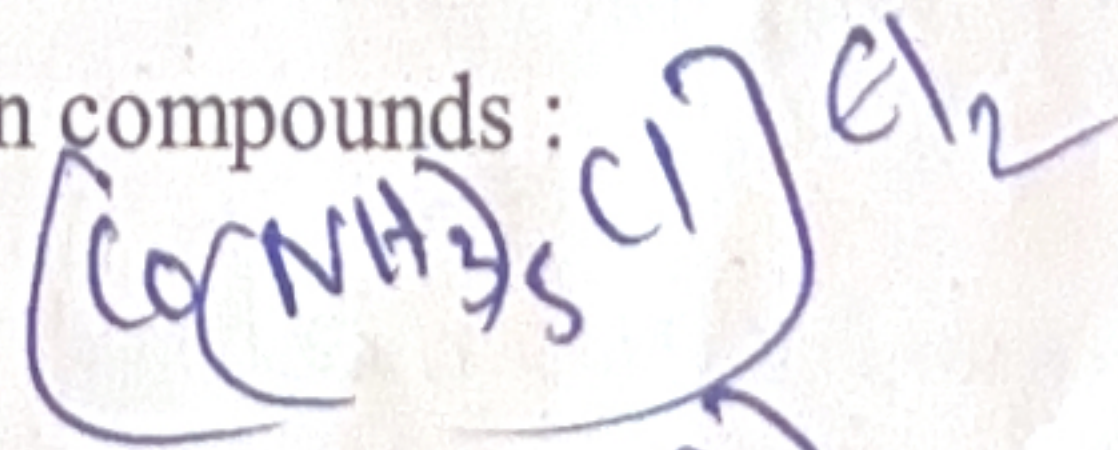
20. What is lanthanoid contraction? What are the consequences of lanthanoid contraction?

21. Draw the hybridisation scheme of $[\text{Co}(\text{NH}_3)_6]^{3+}$ based on Valence Bond Theory.

Predict the geometry and magnetic behaviour of the complex.

22. (i) Write the formulae of the following coordination compounds:

(a) Pentaamminechloridocobalt(III)chloride

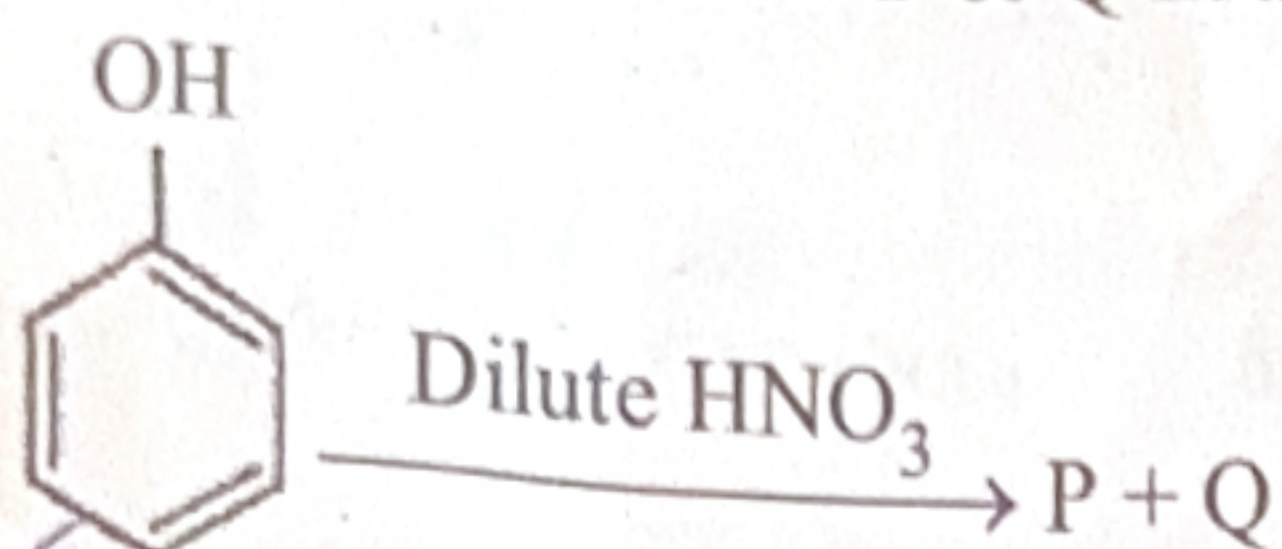


(b) Potassiumhexacyanidoferrate(III)



(ii) Which of the above is a heteroleptic complex?

23. (i) Identify the products P & Q in the following reaction :



(ii) What is the product obtained when phenol is treated with concentrated nitric acid ?

24. (i) An organic compound A on reaction with CrO_2Cl_2 in CS_2 followed by acidification gives benzaldehyde as a product. Identify the compound A and also name the reaction.

(ii) What is the product obtained when the above organic compound A undergoes side chain oxidation with acidic potassium permanganate ?

25. Describe Hinsberg test to distinguish primary, secondary and tertiary amines.

26. Write the classification of proteins on the basis of their molecular shape by giving suitable examples.

Answer any 4 questions from 27 to 31. Each carries 4 scores.

(4 × 4 = 16)

27. (i) What are colligative properties ?

(ii) The boiling point of benzene is 353.23 K. When 1.80 g of a non-volatile solute is dissolved in 90 g of benzene, the boiling point is raised to 354.11 K.

Calculate the molar mass of the solute. K_b for benzene is $2.53 \text{ K kg mol}^{-1}$.

28. (i) Sketch the diagram of a H_2-O_2 fuel cell. (1)
- (ii) Write the chemical equations for electrode reactions in it. (2)
- (iii) Write any two advantages of a fuel cell. (1)

29. Explain the different types of structural isomerism in coordination compounds with the help of suitable examples.

30. (i) Describe the manufacture of ethanol from molasses. (2)
- (ii) What is meant by denaturation of alcohol? (1)
- (iii) Identify the product obtained when ethanol is treated with Conc. H_2SO_4 at 443 K. (1)

31. Describe the following reactions :

- (i) Cannizaro reaction (2)
- (ii) Stephen reaction (2)

$L-1CS$
 $L-2my$
 CH_2-ROOR
 CO
 $SOLN$

CH_2COH

$R-CO + H_2O \rightarrow R-NH_2$
 $R-CO + H_2O \rightarrow R-COOH$
 $R-CO + H_2O \rightarrow R-CO-NH_2$