PRE-BOARD EXAMINATION, JANUARY/FEBRUARY-2020

Time: 3 hours.   **CHEMISTRY**   **Max. Mark: 70**

Date: 05 / 01 /2020   **Class: XII**

All questions are compulsory

Question number **1 to 20** are very short answer questions (objective type) and carry **one mark** each.

Question number **21 to 27** are short answer questions and carry **two marks** each.

Question number **28 to 34** are long answer questions and carry **three marks** each.

Question number **34to 37** are also long answer questions and carry **five marks** each

Use log table if necessary. Use of calculator is not allowed

Section A

Read the given passage and answer the questions 1 to 5 that follow:

A complex compound in which metal atom/ion is bounded with a fixed number of ligands is called co-ordination compound. The chemistry of co-ordination compound is an important and challenging area of modern inorganic chemistry. Chlorophyll, haemoglobin and vitamin B_{12} are some examples of co-ordination compound. A metal ion (M^{n+}) having d^4 valance shell electronic configuration combines with three ethylene diamine (en) ligands to form a co-ordination compound.

1. Draw the crystal field splitting of degenerate state d-orbitals for the above complex formed.
2. Write the electronic configuration of M^{n+} ion after the splitting of d-orbitals.
3. What type of hybridisation will M^{n+} ion has?
4. Draw the isomerism exhibited by this complex has formula $[M(en)_3]^{n+}$
5. $[Ni(CN)_4]^{2-}$ is colourless whereas $Ni(H_2O)_6]^{2+}$is green. Why?

Questions 6 to 10 are one word answers

6. Name the semipermeable membrane used in the desalination of sea water
7. Name the vitamin responsible for convulsions
8. Name the geometry of xenone hexafluoride
9. Write the IUPAC name of monomer of neoprene.
10. Name the step used to determine the molecularity and order of a complex reaction.

Question 11 to 15 are multiple choice questions

11. The product of electrolysis of aqueous $CuSO_4$ using platinum electrode is

    (a) Cu and SO_4 (b) H_2 and O_2 (c) Cu and O_2 (d) H_2 and SO_4

12. The most effective coagulating agent for As_2S_3 sol is

    (a) Na_2SO_4 (b) $CaCl_2$ (c) $Al_2(SO4)_3$ (d) NH_4Cl

13. Which of the following is more acidic in nature

    (a) HOCl   (b) HOClO   (c) $HOClO_2$ (d) $HOClO_3$

14. The increasing order of boiling point of following compounds (I) n-butyl amine, (II) diethyl amine, (III) N,N-diethyl methyl amine are

    (a) III <II <I (b) II < III < I   (c) I < II < III   (d) II < I < III

15. The *copper matte* formed during the extraction of copper contains
    (a) CuS and FeO   (b) Cu_2S and FeS   (c) Cu_2S and FeS_2 (d) Cu_2S and FeS_2

Question 16 to 20

(A) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.

(B) Both assertion and reason are correct statements, and reason is not the correct explanation of the assertion.

(C) Assertion is correct but reason is wrong statement.

(D) Assertion is wrong but reason is correct statement.

16. **Assertion:** the pKb value of aniline is more than that of methyl amine.
    Reason: the lone pair of electron over the nitrogen of aniline are not available for protonation due its delocalisation.

17. **Assertion:** the molar conductivity of weak electrolyte increases with increase in concentration.
    Reason: On dilution, both degree of dissociation and mobility of ions of weak electrolyte increases.

18. **Assertion:** when $AgNO_3$ is added to KI solution, a negative sol of silver iodide is formed.
    Reason: the precipitate attracts the counter ions to form charged colloidal particles

19. **Assertion:** During the esterification carboxylic acid in presence of acid catalyst, the water should be removed as soon as it is formed.
    Reason: water shift the equilibrium in the backward direction.

20. **Assertion:** instead of phenol, sodium phenoxide is used in Kolbe's reaction.
    Reason: Sodium phenoxide is more reactive than phenol which activate the CO_2 for the reaction

Section B

21. At 300K, 36g of glucose present per litre of its solution has an osmotic pressure of 4.98 bar. If the osmotic pressure of the solution is 1.52 bar at the same temperature, what would be its concentration?

22. Write the anode, cathode and overall reactions occur in mercury cell. Why does the voltage of mercury cell remain constant during its operation?

23. Differentiate between lyophilic and lyophobic colloidal solution with suitable examples
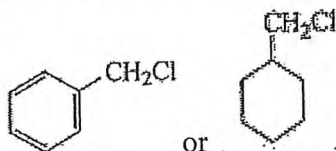
OR

Define the following terms with suitable examples
    (i) Shape selective catalyst   (ii) Multi-molecular colloids

24. An optically active compound 3-bromo-3-methyl hexane reacts with aqueous KOH to give a racemic mixture of product. Write the mechanism involved for this reaction.

25. Which of the following compound would undergo SN^1 reaction faster and why?

or

26. Write structure the monomers of   (i) PHBV   (ii) Buna-S
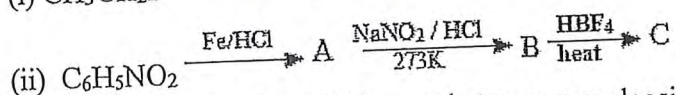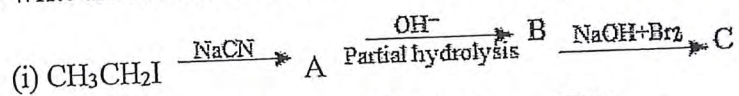27. How do antiseptic differ from disinfectants? Give one example of each

Section C

28. A solution is made by dissolving 30g of a non-volatile electrolyte solute in 90g of water. It has a vapour pressure of 2.8 kPa at 298K, the vapour pressure of pure water is 3.64kPa. Calculate the molar mass of solute.

29. (i) The molar conductivity of 1.5 M solution of an electrolyte is found to be 138.9 S cm^2mol^{-1}. Calculate the conductivity of this solution.

   (ii) Calculate the EMF of the cell $Zn|Zn^{2+}{}_{(0.1M)}\ ||\ Cd^{2+}{}_{(0.01M)}|Cd$ at 298 K

   Given $E^0{}_{Zn^{2+}|Zn} = -0.76\ V$, $E^0{}_{Cd^{2+}|Cd} = -0.40\ V$

30. Explain the role of
   (i) Cryolite in the extraction of alumina   (ii) Silica in the extraction of copper
   (iii) NaCN in the extraction of silver from silver ore.

OR

Write the chemical reactions which take place in the following operations:
   (i) Mond's process for refining of Ni.
   (ii) Extraction of gold from its ore by leaching   (iii) Isolation of zinc from zinc blende.

31. Complete and balance the following reactions:
   (i) $NaOH_{(hot\,+\,conc.)} + Cl_{2(g)} \rightarrow$
   (ii) $PbS + O_3\ (g) \rightarrow$
   (iii) $XeF_6 + H_2O(excess) \rightarrow$

32. (a) Name the reagents used for the preparation of tert.butyl methyl ether.
   (b) Identify the reagents and write the reactions for the following conversions.
   (i) butan-2-one to 2-methylbutan-2-ol   (ii) phenol to 2-hydroxybenzaldehyde.

33. Write the structures of A, B and C in the following reactions.

   (i) $CH_3CH_2I \xrightarrow{NaCN} A \xrightarrow[Partial\ hydrolysis]{OH^-} B \xrightarrow{NaOH+Br_2} C$

   (ii) $C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273K]{NaNO_2\,/\,HCl} B \xrightarrow[heat]{HBF_4} C$

34. (a) What is the structural difference between a nucleoside and a nucleotide?
   (b) Draw the pyranose structure of α-(D)-glucose
   (c) write a chemical reaction to show the presence of -CHO group in a glucose molecule.

Section D

35. (a) Show that the time required for the completion of three-fourth of a first order reaction is twice the time required for the completion of half reaction
   (b) The following data were obtained for the first order thermal decomposition of SO_2Cl_2 at constant volume.

$$SO_2Cl_{2(g)} \rightarrow SO_{2\ (g)} + Cl_{2(g)}$$
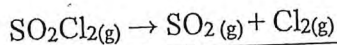
Experiment	Time (second)	Total pressure(atm)
1.	0	0.4
2.	100	0.7

Calculate the rate constant. (Given log 2 = 0.3010, log 4 = 0.6020)

(c) Give one example for a zero order reaction.

OR

(a) A first order reaction is 20% complete in 5 minutes. Calculate the time taken for the reaction to be 60% complete.

(Given log 2= 0.3010, log 4= 0.6020, log 1.25= 0.0969, log 2.5= 0.3979, log 7 = 0.8450)

(b) The rate constant for a zero order reaction in A is 0.0030 Mol $L^{-1} s^{-1}$. How long will it take for the initial concentration of A to fall from 0.10M to 0.075M?

36. (a) Explain the reason for the followings:

(i) CO is a stronger complexing reagent than NH_3

(ii) Mn^{2+} is much more resistant than Fe^{2+} towards oxidation

(iii) Ce^{4+} is used as an oxidising agent in volumetric analysis

(b) Complete and balance the following equations:

(i) $CrO_4^{2-} + H^+ \rightarrow$

(ii) $MnO_4^- + SO_3^{2-} + H^+ \rightarrow$

OR

(a) Describe the preparation of $K_2Cr_2O_7$ from chromate ore (chemical equation only)

(b) How does the acidified potassium dichromate reacts with the followings:

(i) Sn^{2+} ion   (ii) iodide ion

37. (a) Write the chemical equation to illustrate the following name reactions

(i) Stephen's reaction

(ii) Hell-Volhard- Zelinsky reaction

(b) Write the chemical reactions to affect the following transformations :

(i) Benzyl alcohol to 2-phenylethanoic acid

(ii) Propanoic acid to acetic acid

(iii) Propene to acetone

OR

(a) Give a chemical test to distinguish between the following pairs:

(i) benzaldehyde and benzophenone

(ii) benzoic acid and ethyl benzoate

(b) An organic compound A has molecular formula $C_8H_{18}O_2$. It gets hydrolysed with dil.H_2SO_4 and gives a carboxylic acid B and an alcohol C. Oxidation of C with chromic acid also produced B. C on dehydration reaction gives but-1-ene. Write the equations for these chemical reactions