SECOND PRE-BOARD EXAMINATION (2019-2020)

CLASS: XII

Subject: CHEMISTRY **Date: 27.01.2020**

Time allowed: 3 Hours. Maximum Marks: 70

General Instructions:

(a) **All** questions are **compulsory**.
(b) Section A: Q.no. 1 to 20 are very short answer questions (objective type) and carry 1 mark each.
(c) Section B: Q.no. 21 to 27 are short answer questions and carry 2 marks each.
(d) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.
(e) Section D: Q.no. 35 to 37 are also long answer questions and carry 5 marks each.
(f) There is no overall choice. However, an internal choice has been provided in two questions of two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
(g) Use log tables if necessary, use of calculators is not allowed.
(h) Please check this question paper contains **10** printed pages only.
(i) Please check that this question paper contains 3**7** questions.

SECTION - A

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

The molecules present in living system like carbohydrates, proteins, nucleic acids, lipids, vitamins etc. are called Biomolecules. These are formed by certain specific linkages between simple monomeric units. They are essential for the growth and maintenance of our body.

1. Write the name of linkage and monomeric units in the biomolecule: 1

   Maltose

2. Write the chemical reaction which shows that all the C- atoms in glucose are arranged in a straight chain. 1

3. Amino acids show amphoteric behavior. Why? 1

4. Name the vitamin whose deficiency causes 'pernicious anaemia' 1

5. List one difference between keratin and insulin. 1

Questions 6 to 10 are one word answers:

6. Name the method of refining which is based on the principle of adsorption. 1

7. Name the property of colloid involved in the construction of ultra-microscope? 1

8. Which one of the following drugs is an antibiotic: 1

   Morphine, Equanil, Chloramphenicol, and Aspirin?

9. What type of polymer is Neoprene, based on the molecular forces? 1

10. Give the name of the reagent to convert Hexan-1-ol to hexanal. 1

Questions 11 to 15 are multiple choice questions:

11. Which reagent will you use for the following reaction: 1
$CH_3CH_2CH_2CH_3 \rightarrow CH_3CH_2CH_2CH_2C\ell + CH_3CH_2CHC\ell CH_3$
    a. $C\ell_2$ / UV light
    b. $NaC\ell + H_2SO_4$
    c. $C\ell_2$ gas in dark
    d. $C\ell_2$ gas in the presence of Fe in dark

12. Due to the presence of ambidentate ligands, coordination compounds show isomerism. Palladium complexes of the type $[Pd(C_6H_5)_2(SCN)_2]$ and $[Pd(C_6H_5)_2(NCS)_2]$ are; 1
    a. Linkage isomers
    b. Coordination isomers
    c. Ionization isomers
    d. Geometrical isomers.

13. The correct IUPAC name of $[Pt(NH_3)_2C\ell_2]$ is; 1
    a. Diamminedichloridoplatinum (II)
    b. Diamminedichloridoplatinum (IV)
    c. Diamminedichloridoplatinum (0)
    d. Dichloridodiammineplatinum (II)

14. How many ions are produced from the complex $[Co(NH_3)_6]\ C\ell_2$ in solution? 1
    a. 6
    b. 4
    c. 3
    d. 2

15. Which of the following statement is not true about low density polythene? 1
    a. Tough
    b. Hard

c. Poor conductor of electricity
d. Highly branched structure.

Questions 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, but 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: Molarity of a solution in liquid state changes with temperature. 1

    Reason: The volume of a solution changes with change in temperature.

17. Assertion: Proteins are made up of α –amino acids. 1
    Reason: During denaturation, primary structure of proteins are destroyed.

18. Assertion: All collision of reactant molecules leads to product formation. 1
    Reason: Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to the formation of compound.

19. Assertion: In Lucas test 3^0 alcohols react immediately. 1
    Reason: Lucas reagent is a mixture of anhydrous $ZnC\ell_2$ and conc $HC\ell$

20. Assertion: It is difficult to replace chlorine by –OH in chlorobenzene in comparison to that in chloroethane. 1

Reason: C-Cℓ Bond in chlorobenzene has partial double bond character due to resonance.

SECTION : B

21. Draw the structures of the following molecules: 2
    (i) $H_2S_2O_7$
    (ii) $XeOF_4$

22. The rate constant for the first order decomposition of H_2O_2 is given by the equation: $\log k = 14.2 - \frac{10000}{T}$ K. Calculate E_a for the reaction. 2
    ($R = 8.314\ J\ K^{-1}\ mol^{-1}$)

23. a) Blood cells are isotonic with 0.9 % NaCℓ solution. What will happen if we place the blood cells in solution containing 1.2 % NaCℓ? 2
    b) What type of deviation is shown by a mixture of ethanol and acetone? What type of azeotrope is formed by mixing ethanol and acetone?

24. a) Calculate Λ_m^o for $CaC\ell_2$. Given $\lambda^o_{Ca^{2+}} = 119\ S\ cm^2\ mol^{-1}$, $\lambda^o_{Cl^-} = 76.3\ S\ cm^2\ mol^{-1}$. 2
    b) State advantages of H_2 -O_2 fuel cell over ordinary cell.

25. For the complex $[Fe(H_2O)_6]^{3+}$, write the hybridization, geometry, magnetic character and spin of the complex. (Atomic No. of Fe=26) 2

OR

a) Draw structures of geometrical isomers of $[Fe(NH_3)_2(CN)_4]$
b) On the basis of crystal field theory, write the electronic configuration of d^4 in terms of t_{2g} and e_g in an octahedral field when

i) $\Delta_0 > P$ ii) $\Delta_0 < P$

26. a) State the role of NaCN in the extraction of silver. 2

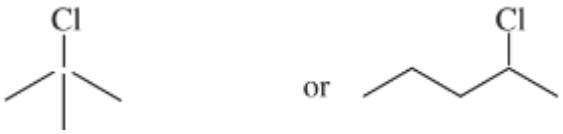
b) What type of ores can be concentrated by magnetic separation method?

OR

a) Write the chemical reaction involved in the refining of Ni by Mond's process.

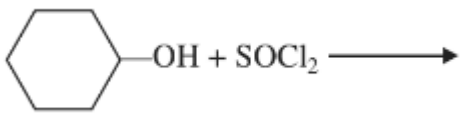
b) Name the method used for refining of germanium metal.

27. a) Which one in the following pair will undergo S_N1 substitution reaction faster and why? 2

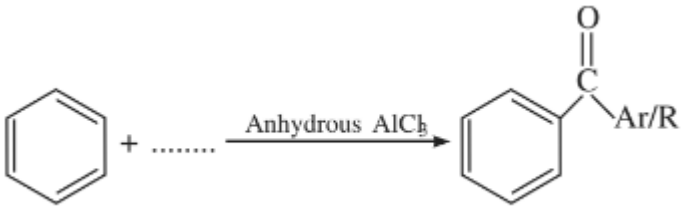


b) Complete the equations for the following reactions:

i.



ii.



SECTION: C

28. Calculate the boiling point of solution when 2g of Na_2SO_4 (M= 142 g/mol) was dissolved in 50 g of water, assuming Na_2SO_4 undergoes complete ionization. 3

(K_b for water = 0.52 K kg mol^{-1})

29. a) A first order reaction has a rate constant of 0.051 min^{-1}. If we begin with 0.10M concentration of the reactant, what concentration of reactant will remain in solution after 3 hours? 3

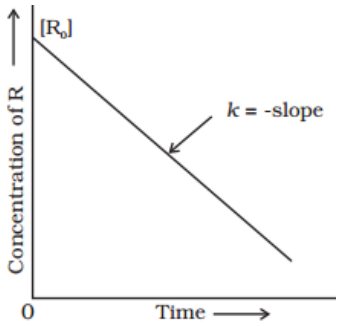
b) What is the effect of adding a catalyst on:

i. Activation energy

ii. Gibb's energy of a reaction?

OR

a) Consider the reaction R→ P. The change in concentration of R with time is shown in the following plot.



i. Predict the order of the reaction.

ii. What are the unit for the rate constant k?

b) Derive the relationship for the time required for the completion of reaction.

30. a) Define electrophoresis. 3

b) Why is $FeC\ell_3$ preferred over $KC\ell$ in case of cut leading to bleeding?

c) In reference to Freundlich adsorption isotherm write the expression for adsorption of gases on solids in the form of an equation.

31. a) Complete the equation $XeF_4 + O_2F_2 \rightarrow$ 3

b) Explain why:

i. Helium is used in diving equipment.

ii. Acidic character increases from HF to HI.

32. a) Write the reaction involved in Kolbe's reaction. 3
b) What happens when phenol is oxidized with $Na_2Cr_2O_7$/ H^+
c) Name the reagent used in following reactions
i. Dehydration of propan-2-ol to propene.
ii. Butan-2-one to butan-2-ol

33. a) Give chemical tests to distinguish between Propanal and propanone. 3
b) $(CH_3)_3C$-CHO doesn't undergo aldol condensation. Comment.
c) Arrange the following compounds in increasing order of their acid strength: Benzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid

OR

a) An aromatic compound 'A' on treatment with $CHC\ell_3$/ KOH gives 2 compounds, both of which give same product 'B' when distilled with zinc dust. Oxidation of 'B' gives 'C' with molecular formula $C_7H_6O_2$. Sodium salt of 'C' on heating with soda lime gives 'D' which may also be obtained by distilling 'A' with zinc dust. Identify A, B, C and D.
b) Write short note on Wolff- Kishner reduction reaction.

34. a) Why is bithional added to soap? 3
b) Explain why the use of the sweetener aspartame is limited to cold foods and drinks?
c) What are Tranquillizers? Give one example.

SECTION: D

35. a) Calculate the standard cell potential of the galvanic cells in which the following reaction take place: 5

$$2Cr_{(s)} + 3Cd^{2+}_{(aq)} \rightarrow 2Cr^{3+}_{(aq)} + 3Cd_{(s)}$$

Also calculate the ΔG^θ value of the reactions.

Given $E^o_{Cr^{3+}/Cr} = -0.74V$, $E^o_{Cd^{2+}/Cd} = -0.40$ V F=96500 C mol^{-1}

b) The electrical resistance of a column of 0.05 M NaOH solution of diameter 1 cm and length 50 cm is 5.55×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity.

OR

a) During electrolysis of Aqueous AgCℓ solution following reactions occur at cathode.

$Ag^+_{(aq)} + e^- \rightarrow Ag_{(s)}$ $\quad E^o_{Ag+/Ag} = +0.80$ V

$H^+_{(aq)} + e^- \rightarrow \frac{1}{2} H_{2(g)}$ $\quad E^o_{H+/H} = 0.0$ V

On the basis of their E^o values, which reaction is feasible at the cathode and why?

b) Represent the cell in which the following reaction takes place

$2Ag^+_{(aq)} + Mg \rightarrow 2Ag_{(s)} + Mg^{2+}$

c) Why does the molar conductivity of a strong electrolyte increase with dilution?

d) A solution of Ni $(NO_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes. What mass of Ni is deposited at the cathode? (At. Mass of Ni =58.7 g/mol; IF=96500 C mol^{-1})

36. a) Convert aniline to phenol. 5

b) Give one chemical test to distinguish between aniline and methylamine.

c) Give the structures of A, B in the following reactions:

$$CH_3CH_2Br \xrightarrow{KCN} A \xrightarrow{LiAlH_4} B$$

d) Assign reason for the following:

i. Although $-NH_2$ is ortho para directing group, yet aniline on nitration gives meta – nitroaniline.

ii. Benzene diazonium chloride is not stored and used immediately after its preparation.

OR

a) Arrange the following compounds in an increasing order of their basic strength in aqueous solutions: NH_3, CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$.

b) Aniline does not undergo Friedel-Crafts reaction. Justify.

c) Write the chemical equation involved in Hoffmann bromamide reaction.

d) What happens when aniline reacts with Bromine water?

e) Give the structures of A, B in the following reactions:

$$C_6H_5NO_2 \xrightarrow{Sn + HCl} A \xrightarrow[273\ K]{NaNO_2 + HCl} B$$

37. a) Calculate the magnetic moment of a divalent ion in aqueous solution if its atomic number is 25. 5

b) Give the chemical reactions involved in the preparation of $K_2Cr_2O_7$ from chromite ore.

c) Give any 2 consequences of lanthanoid contraction.

d) Explain why with the same d^4 configuration Cr^{2+} ion is reducing while Mn^{3+} ion is oxidizing.

OR

a) Complete the following reaction:

i. $MnO_4^- + 4H^+ + 3e^- \rightarrow$

ii. $Cr_2O_7^{2-} + 2\ OH^- \rightarrow$

b) Account for the following

i. Zn^{2+} salts are colourless.

ii. Though Cu has completely filled d- orbitals, yet it is considered to be a transition metal.

iii. Zirconium and Hafnium exhibit similar properties.