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Maximum Marks: 70   Times: 3 hrs

CLASS: 12TH   **SUBJECT: CHEMISTRY**

General instructions:

Read the following instructions carefully

1. There are 35 questions in this question paper with internal choice
2. Section A consists of 18 multiple-choice questions carrying 1 mark each.
3. Section B consists of 7 very short answer questions carrying 2 marks each.
4. Section C consists of 5 short answer questions carrying 2 marks each.
5. Section D consists of 2 case based questions carrying 4 marks each.
6. Section E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of calculators and log tables in not allowed.

Section – A (18 Marks)

The following questions are multiple choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section

1. Alkenes decolourise bromine water in the presence of CCl_4 due to formation of
   (a)Allyl bromide   (b) Vinyl bromide
   (c) Bromoform   (d) vicinal dibromide
2. Which of the following is not chiral?
   (a) 2-Hydroxypropanoic acid
   (b) 2-Butanol
   (c) 2,3-Dibromobutane
   (d)3-Bromopentan
3. The electronic configuration of a transition element X in +3 oxidation state is $[Ar]3d^5$ What is its atomic number?
   (a) 25   (b) 26   (c) 27   (d) 24
4. If the rate of reaction between A and B is expressed as k{A]B] the reaction is:
   (a) First order in A   (b) Second order in B
   (c) Overall third order   (d) All are correct
5. Λ^0_m for weak electrolyte is determined by
   (a) Kohlaursch law
   (b) Nerst equation
   (c) Gibbs energy equation
   (d) None of these
6. The rate constant of a reaction is $1.2 \times 10^{-2}s^{-1}$
   (a) 0   (b) 1   (c) 0.5   (d) 2
7. Arrange the following in the increasing order of their boiling points:
   A; Butanamine B; N,N – Dimethylethanamine
   C; N – Methyl propanamine
   (a)C<B<A   (b)A<B<C
   (c)A<C<B   (d)B<C<A

8. The donor atoms in ethylenediaminetetraacetate ion is
   (a) two N and two O   (b) two N and four O
   (c) four N and two O   (d) three N and three O
9. What would be the major product of the following reaction?
   $CH_3-CH_2-O-(CH_3)_3C + HBr \longrightarrow A + B$
   (a)A = CH_3-CH_2Br, B = $(CH_3)_3C.OH$
   (b)A = $(CH_3)_3C.Br$, B = CH_3-CH_2-OH
   (c)A = CH_3-CH_3, B =C_6H_5Br
   (d)A = CH_3OCH_3, B = CH_3CH_2Br
10. Reduction of aromatic nitro compounds using Fe and HCl gives
    (a) Aromatic oxime
    (b) Aromatic hydrocarbon
    (c) Aromatic primary amine
    (d) Aromatic amide
11. Which of the following tests /reaction is given by aldehydes as well as ketones?
    (a)Fehlings test   (b)Tollens test
    (c) 2,4 DNP test   (d) cannizaro reaction
12. The unit for the rate constant of the second order reaction
    (a) Mol^{-1} litre s^{-1} (b) Mol $litres^{-1} s^{-1}$
    (c) Mol $litre^{-2} s^{-1}$ (d) s^{-1}
13. Which of the following option is correct for $[Fe(CN)_6]$
    (a)$d^2 sp^3$ hybridisation
    (b)sp^3d^2 hybridisation
    (c)sp^3 hybridisation
    (d) dsp^2 hybridization

In the following questions(14 to 18) a statement of **Assertion (A)** is followed by a statement of **Reason (R).** **Mark the correct choice as:**

(a) Both assertion (A) and reason (R) are true and reason is the correct explanation of assertion

(b) Both assertion (A) and reason (R) are true but reason is not the correct explanation of assertion.

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

14. **Assertion** Ethanal is soluble in water due to the formation of hydrogen bonding.
    Reason: Aldehyde and ketones undergo electrophilic addition reaction
15. **Assertion**: Ortho and para-nitrophenols can be separated by steam distillation
    Reason: Ortho isomer associates through intramolecular hydrogen bonding while para

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isomer associates through intermolecular hydrogen bonding

16. **Assertion**: Glucose reacts with hydroxylamine to form an oxime and also adds a molecule of hydrogen cyanide to give cyanohydrin
    Reason: The carbonyl group is present in the open chain structure of glucose

17. **Assertion** Aromatic amines can not be prepared by Gabriel phthalimide reaction
    Reason: Tertiary amines are more basic than primary amines in gaseous phase.

18. **Assertion**: The ability of oxygen to stabilize higher oxidation states exceeds that of fluorine
    Reason: Oxygen has the ability to form multiple bonds.

Section – B (14 Marks)

This section contains 7 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

19. For first order reaction plot graph between
    (a) In[R] and time   (b)) $\log([R^0/R])$ and time

20. Write down the structures and names of the products formed when D-glucose is treated with
    (a) Hydroxylamine (b) Acetic anhydride.

21. Which alkyl halide from the following pair is (i) Chiral and (ii) undergoes SN^1 reaction faster? Explain
    (a) $(CH_3)_3CBr$ (b) $CH_3CH_2CHBrCH_3$

22. (a) Give example of two Ambidentate ligands
    (b) How many ethane diamine ligands are needed to make a homoleptic octahedral complex.

23. Calculate the EMF of the cell in which the following reaction takes place:
    Nis(s) + 2Ag$^+$ (0.002 M) ⟶ Ni^{2+} (0.160 M) + 2Ag(s) Given that $E^0_{(cell)}$ = 1.05 V (Given: log 10 = 1, log 3 = 0.4771, log 4 = 0.6021)
                       OR
    E^0_{cell} for the given redox reaction is 2.71 V
    Mg(s) + Cu^{2+}(0.01 M) ⟶ Mg^{2+} (0.001 M)+ Cu(s)
    Calculate E_{cell} for the reaction. Write the direction of flow of current when an external opposite potential applied is:
    (a) Less than 2.17 V   (b) greater than 2.71V

24. The rate constant for a reaction of Zero order in A is 0.0030 mol L^{-1}s^{-1}. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M?
                       OR

For the first order thermal decomposition reaction, the following data were obtained:
$C_2H_5Cl(g)$ $C_2H_4(g)$ + HCl(g)

Time/sec	Total pressure/atm
0	0.30
300	0.50

Calculate the rate constant (Given: log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021)

25. (a)What types of aldehydes undergoes Aldol condensation reaction?
    (b) Arrange the following compound groups in the increasing order of their property indicated: Propanol, Propane, Propanal (boiling point)

Section – C (15 Marks)

This section contains 5 questions with internal choice in two questions.The following questions are very short answer type and carry 3 marks each

26. (a) Name the reagents which are used in the following conversions:
    (i) A primary alcohol to an aldehyde (ii) Butan-2-one to butan-2-ol
    (b) $CH_3CH_2OCH_3$ + HI→ ?+?
                       OR
    (a)Give mechanism of preparation of ethoxy ethane from ethanol
    (b)How would you obtain Picric acid (2, 4, 6-trinitrophenol) from phenol.

27. (a)Explain why $[Fe(H_2O)_6]^{3+}$ has magnetic moment value of 5.92 BM whereas $[Fe(CN)_6]^{3-}$ has a value of only 1.74 BM
    (b) Write the IUPAC name of the complex $[Co(en)_2NO_2Cl]^+$. What type of structural isomerism is shown by this complex?

28. An aqueous solution freezes at 272.4 K while pure water freezes at 273 K. Determine (i) Molality of solution. (ii) Boiling point of solution. Given: K_f, 1.86 K Kg mol^{-1}. K_b=0.512 K Kg mol^{-1}

29. Write short notes on the following
    (a)Carbylamine reaction
    (b)Gabriel phthalimide reaction
    (c)Hoffmann bromamide reaction
                       OR
    Write the structures of main products when benzene diazonium chloride ($C_6H_5N_2+Cl^-$) reacts with the following reagents:
    (a) CuCN/KCN   (b) H_2O (c) CH_3CH_2OH

30. What happens when:
    (a) Chlorobenzene is treated with Cl_2/FeCl$_3$
    (b) Ethyl chloride is treated with AgNO$_2$
    (c) 2-Bromopentane is treated with alcoholic KOH?

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The following questions are case based questions. Each question has an internal choice and carries 4 marks each. Read the passage carefully and answer the questions that follow

31. Read the passage given below and answer the following questions:
When a protein in its native form, is subjected to physical changes like change in temperature or chemical changes like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity. This is called denaturation of protein. The denaturation causes change in secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curdling of milk, formation of cheese when an acid is added to milk.
(a) What is the effect of denaturation on structure of protein?
(b) Explain peptide linkage
(c) Differntiate between globular and fibrous protein with examples. Which out of amylose and amylopectine is insoluble in water and why?.

OR

Which out of amylase and amylopectine is insoluble in water and why?

32. Read the passage given below and answer the following questions: The properties of the solutions which depend only on the number of solute particles but not on the nature of the solute are called colligative properties. Relative lowering in vapour pressure is also an example of colligative properties. For an experiment. sugar solution is prepared for which lowering in vapour pressure was found to be 0.061 mm of Hg. (Vapour pressure of water at 20°C is 17.5 mm of Hg)
(a) Which colligative property is best for calculating molar mass of Biomolecules?
(b) The vapour pressure of solvent gets lowered, when a non-volatile solute is to it. Why?
(c)Equimolal solutions of NaCl and $BaCl_2$ are prepared in water. Freezing point of NaCl is found to be -2° C, What freezing point do you expect for $BaCl_2$ solution?

OR

Out of 0.1 molal solution of glucose and sodium cholide, respectively which one will have a higher boiling point any why?

This section contains 3 questions with internal choice in two questions. The following questions are very short answer type and carry 5 marks each

33. (a)Following reactions can occur at cathode during the electrolysis of aqueous silver nitrate solution using Pt electrodes
$Ag+(aq) + e \longrightarrow Ag(s)$: E^0= 0.80 V
$H^+(aq) + e-- \longrightarrow 1/2H_2(s)$: E^0=0.00 V
On the basis of their standard electrode potential values, which reaction is feasible at cathode and why?
(b) can you store copper sulphate solution in a zinc pot? Explain.
(c)What is the quantity of electricity in Coulombs required to produce 4.8 g of Mg from molten $MgCl_2$?
How much Ca will be produced if the same amount of electricity was passed through molten $CaCl_2$? (Atomic mass of Mg 24 u, atomic mass of Ca =40 u

OR

(a) Why does the cell voltage of a mercury cell remain constant during its lifetime?
(b) How does Molar conductivity varies with decrease in concentration? Explain.
(c) Calculate the mass of Ag deposited at cathode when a current of 2 Amperes was through a solution of $AgNO_3$, for 15 minutes. (molar mass of Ag=108g/mol, F = 96500 C)

34. (a) Formaldehyde does not take part in Aldol condensation. Why?
(b)Convert the following
(i) Ethyl benzene to benzoic acid
(ii) Ethanal to but-2-en-1-al
(iii) ethanenitrile to ethanal
(iv)Toluene to benzaldehyde

OR

(a)Give Chemical test to distinguish between ethanal and propanal
(b)Draw the structure of the following derivatives?
(i)2,4-DNP of benzaldehyde
(ii) oxime of propanone
(c) Complete the following reactions
(i) Ethyl benzene $\xrightarrow{KMnO_4 /KOH}$
(ii) Benzene $\xrightarrow{CH_3COCl/anh.AlCl_3}$

35. Give reasons for the following:
    (a) Transition elements act as catalysts
    (b) Transition elements have high enthalpy of atomization
    (c) Why is Cr^{2+} reducing and Mn^{3+} is oxidising when both have d^4 configuration?
    (d) Why manganese has lower melting point than chromium?
    (e) Which one of the followings would feel attraction when placed in a magnetic field
    $$Sc^{3+}, Fe^{2+}, Z^{n2}+, V^{2+}, Mn^{2+}$$
    OR
    (a) Account for the following:
    (i) Manganese shows maximum number of oxidation states in 3d series
    (ii) Actinoids show larger number of oxidation state than lanthinoids
    (iii)Ti^{4+} is colourless whereas V^{4+} is coloured in an aqueous solution
    (b) Write the chemical equations for the preparation of $KMnO_4$ from MnO_2. Why does purple colour of acidified permanganate solution decolourise when it oxidises Fe^{2+} to Fe^{3+}?