KENDRIYA VIDYALAYA SANGATHAN
CHEMISTRY (THEORY)
CLASS XII

Time allowed: 3 Hours   *Maximum Marks: 70*

General instructions:

(i) **All** questions are compulsory.

(ii)   Marks for each question are indicated against it.

(iii)   Question numbers 1 to 5 are very short answer question and carries 1 mark each.

(iv)   Question numbers 6 to **10** are short answer question and carries 2 mark each.

(v)   Question numbers 11 to 22 are also short answer question and carries 3mark each.

(vi)   Question number 23 is value based carrying 4 marks.

(vii)   Question numbers 24 to 26 are long answer questions and carries 5marks each.

(viii)   Use log tables, if necessary. Use of calculators is **not** allowed.

1. On heating crystals of KCl in potassium vapours, the crystals start exhibiting a violet colour, *why?*

2. Give the IUPAC name of following compound-

$_3CH_3$-CH2-CH2-CH_2-CH_2-CH(Cl)-CH(Br)-CH_3

3. Arrange the following in increasing order of the acidic character:

   $HCOOH, CH_2ClCOOH, CF_3COOH, CCl_3COOH$

4. What are zwitter ions?

5. Alitame is not used as a sweetening agent in the food& why

6. Explain Kohlrausch's law of independent migration of ions. Mention one application of kohlrausch's law.

'OR'

A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using a current of 5.0 ampere for 20 minutes. What mass of nickel will be deposited at the cathode? (At. Mass of Ni= 58.7)

7. A first order reaction is found to have rate constant,

   $k=5.5 \times 10^{-14} s^{-1}$ Find the half life of the reaction?

8. Write the structures of following species:

   (i) H_3PO_2

   (ii) H_2SO_5

9. How would you get

(a)   Phenyl benzoate acid from phenol

(b)   Salicylic acid from phenol.

10. Explain giving reasons:

   (i) Propanol has higher b.p. than that of butane.

   (ii) Alcohols are comparatively more soluble in water than hydrocarbon of comparable molecular masses.

11. Silver metal crystallizes with a face centre cubic lattice. The length of unit cell is found to be 4.077 x 10^{-8} cm. Calculate atomic radius and density of silver. (atomic mass of Ag = 108u, NA = 6.02 x 1023 mol-1)

12. Write the Nernst Equation & Determine the emf of cell in which the following reaction takes place:

   $Ni(s) + 2Ag^{+}(0.002M) (aq) ---\rightarrow Ni^{2+} (0.16M)(aq) + 2Ag(s), E^0=1.05V$
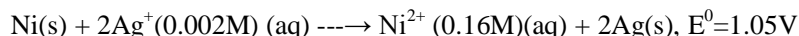
(IF = 96500 coulomb, E^0 value of Ni = - 0.23V and of Ag is 0.80V)

13. For a certain chemical reaction

      A + 2B → 2C + D
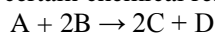
      The experimentally obtained information is tabulated below:

Experiment	[A]$_\circ$	[B]$_\circ$	Initial rate of reaction
1	0.30	0.30	0.096
2	0.60	0.30	0.384
3	0.30	0.60	0.192
4	0.60	0.60	0.768

      For the reaction

    (i)   Derive the order of reaction w.r.t. both the reactants A and B.

    (ii)   Write the rate law.

    (iii)   Calculate the value of rate constant k.

14. Describe the role of following:

    (i)   NaCN in extraction of Silver from silver ore.

    (ii)   Iodine in refining of Titanium

    (iii)   Cryolite in the metallurgy of aluminium

                  OR

    Describe the principle involved in each of the following processes of metallurgy

    (i)   Froth floatation method

    (ii)   Electrolytic refining of metals
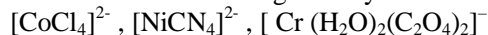
    (iii)   Zone refining of metals

15. Give reasons

    (i) N does not form NCl_5 while P can form PCl_5

    (ii) Red phosphorus is inert at room temperature

    (iii)H_2O is a liquid while H_2S is gas
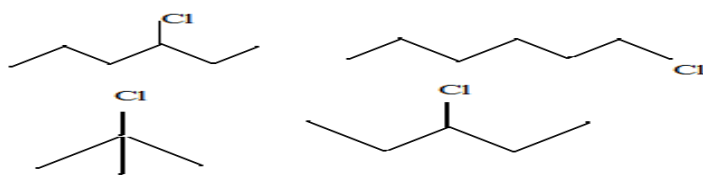
16. Complete the following reactions

    i. Cl_2+NaOH (Hot & Conc.) →

    ii. NH_3 (excess) + Cl_2 →

    iii. $(NH_4)_2SO_4$ + $Ca(OH)_2$

17. Write the IUPAC name and geometry of following complexes:

    $[CoCl_4]^{2-}$, $[NiCN_4]^{2-}$, [Cr $(H_2O)_2(C_2O_4)_2]^-$

    (At. No. : Co= 27, Ni=28, Cr=24)

18. (a)In the following pairs of halogen compounds, which compound undergoes faster S_N1 reaction?

    (b) Out of C6H5CH2l & C6H5CH2Cl which one is more reactive in SN2 substitutions reaction

19. Write a short note on the following:

  (i) Gabriel phthalimide synthesis.

  (ii) Hofmann bromamide reaction.

 (iii)Ammonolysis

20. . Define the following:

    (i)   Invert sugar

(ii)   Denaturation of protein

(iii)Anomers

21. (a)Write the names and structures of monomers of the following polymers:

(i)   Bakelite   (ii)   Nylon-6,6

(b) Name a polymer used for non-stick kitchen wares. Write the chemical equation involved in its synthesis.

22. (a)Explain following with one example each

(i) Analgesics (ii) Antipyretics

(b) What composition of phenol acts as antiseptic and disinfectant

23. Swapnesh, living in Ooty, was washing clothes in cold water. He found that the clothes were not getting clean. Geeta , his niece, suggested that he wash the clothes in warm water. Washing of clothes with soaps or detergents is easier in Luke warm water than cold water.

a. Why?

b. What value do you derive from this?

24. (a) State Henry's laws mention some of its applications

(a) Why is freezing point of depression of 0.1M NaCl solution nearly twice than of 0.1M glucose solution?

OR

(a) (i) State the difference between molarity and molality of solution

(ii) What is a brine solution?

(b) A solution of glycerol (m.M=92 g/mol) in water was prepared by dissolving some glycerol in 500g of water. This solution has a boiling point of 100.420C. What mass of glycerol was dissolved to make this solution? Kb for water=0.5121kkg/mol.

25. (a)Complete the following reactions:

(i)$MnO_4^- + Fe^{2+} \rightarrow$

(ii)$Cr_2O_7^{2-} + Fe^{2+} \rightarrow$
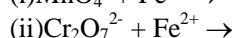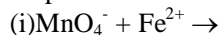
(b)How you can prepare $KMnO_4$ from chromite ore . Write down the reactions involved

OR

(a) Assign reasons for the following:

(i)Transition metals have high enthalpy of atomisation.

(ii)Transition metal compounds are coloured.

(iii)Zn ,Cd & Hg are not regarded as transition elements

(b) What is lanthanoid contraction? Mention its consequences.

26. (a) Illustrate the following name reactions:

(i)   Cannizzaro reaction

(ii)   Clemmensen reaction

(b) How would you obtain the followingconversions:

(i) Butanoic acid from Butan -1-ol

(ii) But-2-enal from ethanol

(iii)   Toluene to Benzoic Acid

OR

(a)An unknown aldehyde (A) on reacting with alkali gives a β -Hydroxy-aldehyde, which losses water to form an unsaturated aldehyde , 2-butenal.Another aldehyde (B) undergoes disproportionation reaction in the presence of conc. Alkali to form products C and D.C is an arylalcohol with the formula C_7H_8O.

(i)   Identify A and B

(ii)   Write the sequence of reactions involved.

(b)   Give a chemical test to distinguish between phenol and benzoic acid.

…………………………Best of luck……………………………………………..

Marking Scheme

Q.No.	Answers	Value Points

1. Due to F- center. (1)
2. 2-Bromo-3-chloro octane. . (1)
3. HCOOH < CH2ClCOOH < CCl3COOH < CF3COOH (1)

4. Zwitter ion formed by neutralization of acidic and basic centers present within a molecule (1)
5. It is difficult to control its sweetness and high calorific value (1)
6. Kohlrausch's law (1)

   Any one application (1)

7. $t_{1/2} = 0.693/K$ (1)
   $= 0.693/5.5 \times 10^{-14}$ (1/2)
   $= 1.26 \times 10^{13}$ Sec (1/2)
8. Correct Structure (1+1)

9. (a) $C_6H_5OH + C_6H_5COCl \square C6H5OCOC_6H_5 + HCl$ (1)

   $\qquad\qquad\qquad H+$

   (b) $C_6H_5OH + NaOH + CHCl_3 \rightarrow$ Salicyl aldehyde+ $NaCl + H_2O$ (1)

10. (i) Intermolecular H- bonding in butanol,but not in butane (1)
    (ii) Because of presence of intermolecular H- bonding in alcohols (1)

11. Given: A = 4.077 x 10-8cm, Z=4, M=108g mol_{-1}, N_A=6.022 x 10_{23}
    $d = Z M/a3* N_A$. ½
    substitution ½
    d = 10.58 g cm-3 ½
    r=? FORMULA USED ½
    substitution ½
    r – 1.44 x 10_{-8} cm ½

12. Formula used
    n=2 ½
    substituting the values ½
    E_{cell}=0.9142 V

    ½

13. (i) Order of reaction w.r.t . A=2 Order of reaction w.r.t .B=1 1
    (ii) rate = $k[A]^2[B]^1$

    (iii) K= Rate/ $[A]^2[B]^1$ =0.096/ $(0.3)^2(0.3)$=3.55s^{-1}

14. Role of each 1x 3=3

    Or
    Principle involved 1x 3=3

15.) (i) Due to non-availability of vacant d-orbital. On N, it cannot extend its valency and does not form pentahalides.

    (ii) Lesser angular strain than white phosporus

    (iii) due to strong H-bonding present in H2O than in H2S (no H-bonding)

16.   (i) $Cl_2(aq) + 2NaOH(aq) \rightarrow NaOCl(aq) + NaCl(aq) + H_2O(l)$ 1

      (ii)$NH3 + Cl2 \rightarrow NH2Cl + HCl$ 1

        $NH2Cl + Cl2 \rightarrow NHCl2 + HCl$

        $NHCl2 + Cl2 \rightarrow NCl3 + HCl$

      (iii)$Ca(OH)2 + (NH4)2SO4 \rightarrow CaSO4 + 2(NH4) OH$ 1

17. (i) $[CoCl_4]^{2-} \rightarrow sp^3$, tetrahedral, paramagnetic   1

    (ii) $[NiCN_4]^{2-} \rightarrow dsp^2$, square planar, diamagnetic   1

    (iii) $[CrF_6]^{3-} \rightarrow sp3d2$, octahedral, paramagnetic   1

18. (a)With correct reason
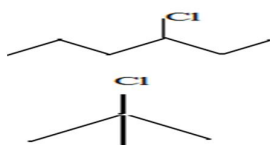
    (c) C6H5CH2I , as Iodine is the better leaving group.

19.   Correct explanation with reaction   (1x3=3)

20.   Definition   (1x 3=3)

21.   (a)(I) Phenol(C_6H_5OH) and Formaldehyde (HCHO)   1

    (ii) Hexamethylenediammine (H_2N-$(CH_2)_6$-NH_2) &Adipicacid(HOOC-$(CH_2)_4$-COOH)   1

    (b) Teflon   ½

     Reaction   ½

22.   (a) Correct definition with examples   1x2=2

    (b)0.1% phenol as antiseptic & 1% used as disinfectant.   1

23.   (a) Soap or detergent forms emulsion with water at kraft temperature.

    (b) Knowledge is useful when it is put In practice or any other.

24.   (a) At a constant temperature, the amount of a given gas that dissolves in a given type and volume of liquid is directly proportional to the partial pressure of that gas is equilibrium with that liquid".   1

    Applications: 1. In Scuba diving   2. In soft drinks

    (b)formula used   1

    Calculation of molar masses   ½

Calculation of no. of moles of CCL4=0.45 and C6H6=0.38   ½
Mole fraction of benzene=0.457
OR
(a) (i) Molarity is T dependent but molality is independent of it.   1
    (ii) 0.91 NaCl % (aq)   1
(b) Tb=0.42K   1
    Formula used   1
    Wb = 37.7G   1
25. (a) 5Fe2+ + MnO4- + 8H+ -> 5Fe3+ + Mn2+ +4H2O   1
    (b)Cr2O72- +6Fe2+ + 14H+ = 2Cr3+ + 6Fe3+ + 7H2O   1
    (c) Correct answer with equations   3
            OR
      (a)(i)Due to unpaired electrons form strong metallic bond.
         (ii) Due to d-d transition.
          (iii)Due to completely filled d orbitals in their ground state and commonly
occurring O.S.
         (b)   Correct explanation with consequences   3+2
26. (a)(i) reaction   1

     (ii) Reaction   1
    (b) Reactions with suitable reagents
          1x3=3
                                    OR
(a) (i)**A**= CH_3CHO 1
     B=C_6H_5CHO 1
     (ii) 2CH_3CHO[**A**] + DilNaOH →$CH_3CH(OH)CH_2CHO$ →$CH_3CH=CHCHO$ 1
     2C_6H_5CHO[**B**] + Alkali → $C_6H_5CH_2OH$ + $C_6H_5COO^-$ 1
     (iii) Toluene   1

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