Radiant Secondary School   Set-A
Bheemdattnagar, Kanchanpur
Second Terminal Examination (2081)   FM:
Time: 3 Hrs   Subject: Chemistry, Grade XII, Subject Code:30

Candidates are required to give answer in their own words as far as practicable. The figure given in the margin indicates full marks.

Attempt all questions.

Group A

Rewrite the correct options of each questions in your answer sheet. (11×1=11)

1. Lithopone is a mixture of
   (a) $ZnSO_4$. $BaSO_4$
   (b) ZnS . $BaSO_4$
   (c) $ZnCO_3$. $BaCO_3$
   (d) ZnS . Na_2SO_4

2. $CuSO_4$ is not stored in aluminium bottle because
   (a) Cu-gets oxidised
   (b) Cu-gets reduced
   (c) Al-gets reduced
   (d) $CuSO_4$-gets decomposed

3. Transition metals are coloured due to
   (a) small size
   (b) metallic nature
   (c) unpaired d-electrons
   (d) all

4. Molasses is converted into glucose and fructose by
   (a) invertase enzyme
   (b) zymase enzyme
   (c) diastase enzyme
   (d) maltase enzyme

5. Electrophilic substitution in phenol is not favorable at...
   (a) o-position only
   (b) p-position only
   (c) m-position
   (d) o- or p- or in both positions

6. Methylamine is more basic than ammonia due to presence of
   (a) two electrons with nitrogen
   (b) electron withdrawing methyl group
   (c) electron releasing methyl group
   (d) none of above

7. Which amine is more basic
   (a) dimethylamine
   (b) trimethylamine
   (c) methylamine
   (d) aniline

8. Which one of the following compounds has highest boiling point?
   (a) Pentane
   (b) Ethoxyethane
   (c) Butane
   (d) Butan-1-ol

9. An aqueous solution of $CuSO_4$ is
   (a) acidic
   (b) basic
   (c) neutral
   (d) Amphoteric

10. The p^H of a solution obtained by dissolving 0.4 g of solid NaOH in one liter of water wil be
    (a) 2
    (b) 10
    (c) 11
    (d) 12

11. What is the molarity of 0.4 N Na_2CO_3 solution?
    (a) 0.1 M
    (b) 0.2 M
    (c) 0.3 M
    (d) 0.4 M

Group B

(8×5 = 40)

12. (a) What is meant by transition metals? (1)
    (b) Justify giving proper reason:
    (i) Transition metals mostly form coloured compounds.
    (ii) Zinc is regarded as non-typical transition metal.
    (iii) Draw splitting of d-orbital in octahedral field showing e_g and t_{2g} sets. (1+1+2)

    OR

    Write down the chemistry of corrosive sublimate. (3+2)

13. Copper is considered as coinage metal and it belongs to the IB group of the periodic table.
    (a) Why the elements of group IB are called coinage metals?
    (a) Name the process of concentration of copper pyrite during the extraction of copper.
    (b) Write chemical reaction involved in roasting during the extraction of copper.
    (c) What is blister copper? (1+1+2+1)

14. Identify A, B, C and D in the following reaction sequence giving their IUPAC name.

    $$A \xrightarrow[\Delta]{H_2O/H^+} B \xrightarrow[\Delta]{SOCl_2} C \xrightarrow[\Delta]{alc.\ KCN} D \xrightarrow[\Delta]{LiAlH_4} E$$

    Compound B is primary alcohol that gives positive iodoform test. (5)

    OR

    An alkene (A) on ozonolysis gives an aldehydes and a ketone. The aldehyde and the ketone on Clemmensen reduction give ethane

and propane respectively. Identify the alkene (A) and give its IUPAC name. Also give the reactions involved. What product would you expect when (A) is treated with HBr?　(4+1)

15. Aromatic halogen compounds in which halogen is directly attached to benzene ring are called as haloarenes.
(a) Why are haloarenes less reactive than haloalkanes towards nucleophilic substitution reactions?
(a) How is chlorobenzene prepared by Sandmeyer reaction?
(c) What happens when chlorobenzene is heated with chloral in presence of conc. H_2SO_4?　(2+1+2)

OR

Ethers are a class of organic compounds in which an oxygen atom is bonded to two same are different organic groups.
(a) What are symmetrical and unsymmetrical ethers? Give one example of each.
(b) Give Williamson's synthesis of an unsymmetrical ether.
(c) What happens when ethoxyethane is exposed to air in presence of sunlight?
(d) Give the product formed when anisole is heated with excess of HI.　(2+1+1+1)

16. What are simple and mixed amines? Give at least one example of each.　(2.5+2.5)

OR

Give the Reimer-Tiemann's and Kolbe reactions in phenol?　(2+3)

17. Tertiary(3^0) amine is least basic among amines. Give the reason.　(5)

OR

Write notes on esterification and iodoform test of ethyl alcohol　(2+3=5)

18. What is meant by Bronsted-Lowry concept of acids and bases? Point out its limitations.　(3+2)

OR

Deduce the relationship between normality and molarity. If 10 cc of H_2SO_4 is completely neutralized by 17 cc of decinormal Na_2CO_3, what is normality of H_2SO_4?　(3+2)

19. Define the following terms: (5×1 = 5)

(i) Ionic product of water
(ii) Buffer solution
(iii) Equivalence point
(iv) Normality
(v) Standard solution

Group C　(3×8 = 24)

20. Define solubility product principle and common ion effect. Apply the solubility product principle and common ion effect in salt analysis of group IIIB metal ions. The solubility product of AgCl is $1.8×10^{-10}$. What mass of AgCl will be precipitated if 0.2 M HCl solution is added to the saturated solution of AgCl? (Ag = 107, Cl = 35.5)　(2+3+3)

OR

Define rate of reaction. How does concentration, surface are of reactant and temperature affect the rate of reaction.
For a reaction $Cl_2 + 2NO \rightarrow 2NOCl$, following data are obtained.

Expt. No.	$[Cl_2]$ mol L^{-1}	$[NO]$ mol L^{-1}	Initial rate (Mol $L^{-1}sec^{-1}$)
1	0.02	0.01	$2.4×10^{-4}$
2	0.02	0.03	$2.16×10^{-3}$
3	0.04	0.03	$4.32×10^{-3}$

(i) Determine the order of reaction with respect to Cl_2 and NO, and overall order of reaction.
(ii) What is initial rate if $[Cl_2]=0.5$ mol L^{-1} and $[NO] = 0.4$ mol L^{-1}.

21. What are simple and mixed amines? How are $1^0, 2^0$ and 3^0 amines separated from their mixture by Hoffmann's method?　(2+6)

22. A sweet smelling organic compound (A) slowly oxidized by air in the presence of sunlight to give highly poisonous compound carbonyl chloride.
(a) Why the above compound (A) is stored in dark brown airtight bottle containing small amount ethanol?
(b) Give reaction involved in the preparation of compound (A) from ethanol.
(c) How would you convert compound (A) into:
(i) chloretone (ii) chloropicrin (iii) ethyne
(d) Why the compound (A) does not give white precipitate on treatment with aqueous $AgNO_3$ solution?　(1+2+3+2)

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Attempt all questions.

Group A

Rewrite the correct options of each questions in your answer sheet. (11×1=11)

1. Tailing of mercury is due to the formation of
   (a) Hg_2O (b) HgO (c) HgO_2 (d) $\overline{Hg_2O_2}$

2. Bell metal is an alloy of
   (a) Cu, Pb and Sn   (b) Cu and Sn
   (c) Zn and Pb   (d) Cu, Zn and Sn

3. Which of the following transition metal is ferromagnetic?
   (a) Zn   (b) Fe   (c) Cu   (d) Hg

4. Starch is converted into maltose by
   (a) invertase enzyme   (b) Zymase enzyme
   (c) diastase enzyme   (d) maltase enzyme

5. In electrophilic aromatic substitution reaction –OH group acts as
   (a) *o*-directing   (b) *p*-directing
   (c) *m*-directing   (d) *o*- and *p*-directing

6. Which of the following amines is least basic
   (a) methylamine   (b) dimethylamine
   (c) trimethylamine   (d) aniline

7. Aliphatic amines are
   (a) alkyl derivatives of ammonia
   (b) alkyl derivatives of nitrous acid
   (c) aryl derivatives of ammonia
   (d) aryl derivatives of nitrous acid

8. Which one of the following compounds has lowest boiling point?
   (a) Pentane (b) Ethoxyethane (c) Butane (d) Butan-1-ol

9. Aqueous solution of sodium acetate is
   (a) acidic   (b) basic   (c) neutral   (d) Amphoteric

10. The p^H of 0.001 M KOH solution is
    (a) 10^{-11} (b) 10^{-3} (c) 3   (d) 11

11. Normality of 1 M solution of H_3PO_4 is
    (a) 1N   (b) 2N   (c) 3N   (d) 4N

Group B   (8×5 = 40)

12. X is an ore of metal M. X on roasting gives metal oxide and a gas as a major by-product. The gas when passed through acidified $K_2Cr_2O_7$ solution turns green.
    (a) Identify the ore X.
    (b) Write the reaction involved during roasting.
    (c) Write the action of the gas on acidified $K_2Cr_2O_7$.
    (d) Convert the metal M into its vitriol.   (1+1+1+2)

13. (a) Cu^+ salts are white while Cu^{2+} salts are coloured. Why?
    (b) Why do transition elements show variable oxidation states? In 3*d* series (Sc to Zn) which element shows maximum number of oxidation state.
    (c) Define complex ion giving an example. $[Fe(CN)_6]^{3-}$ is more stable than $[Fe(CN)_6]^{4-}$. Why?   (1+2+2)

OR

Write down the chemistry of blue Vitriol.   (5)

14. An alcohol (P) having molecular formula $C_4H_{10}O$ undergoes Victor Meyer test to give blue colour at the end of reaction when aqueous KOH is added.
    (a) Draw structural formula and write IUPAC name of P.
    (b) Write down complete chemical reactions involved in Victor Meyer test of P.
    (c) What product would you expect when P is oxidized?
    (d) How would you convert propan-1-ol into propan-2-ol.   (1+2+1+1)

OR

Identify A, B, C and D in the following reaction sequence giving their IUPAC name.

$$A \xrightarrow[\Delta]{H_2O/H^+} B \xrightarrow[\Delta]{SOCl_2} C \xrightarrow[\Delta]{alc.\ AgCN} D \xrightarrow[\Delta]{LiAlH_4} E$$
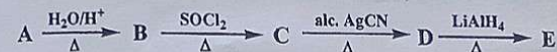
Compound B is primary alcohol that gives positive iodoform test.   (5)

15. (a) Give chemical reaction involved in the preparation of chlorobenzene from: (i) benzene (ii) benzenediazonium chloride.
(b) Why is chlorobenzene less reactive than chloroethane towards nucleophilic substitution reaction?
(c) What happens when chlorobenzene is heated with $LiAlH_4$?

(2+2+1)

OR

Ethoxyethane is a colourless, highly volatile and highly inflammable liquid, which is used as safe anaesthetic.
(a) Why it is dangerous to distil an old sample of ether stored for long time?
(b) Give Wlliamson's synthesis of ethoxyethane.
(c) Convert ethoxyethane into methoxyethane.
(d) What happens when ethoxyethane is heated with excess of HI?

(2+1+1+1)

16. Give the reactions of ethyl alcohol with conc. H_2SO_4 (1+2+2)

OR

What is carbylamine test? What product do you expect when $2°$ and $3°$amines reacts with excess of alkyl halides? (2+3)

17. Aliphatic amines are more basic than ammonia explain?(5)

OR

Write notes on oxo process and hydroboration oxidation.

(2.5+2.5=5)

18. What is meant by Lewis acids and bases? Point out its limitations.

(3+2)

OR

What are primary and secondary standard substances? Give examples. 100 ml of Na_2CO_3 solution contains 0.5 g of Na_2CO_3. If 10 ml of this solution is added to 'X' ml of water to obtain 0.01 M Na_2CO_3 solution, calculate the value of 'X'. (2+3)

19. Define the following terms: ($5×1 = 5$)
(a) Ostwald's dilution law   (b) Degree of ionization
(c) p^H of solution (d) Indicator (e) end point.

Group C   ($3×8 = 24$)

20. An unsaturated hydrocarbon (C_3H_6) undergoes Markovnikov's addition of HBr to give compound (A). Compound (A) when heated with aqueous alkali yield (B). When (A) is react with alcoholic solution of KCN to give compound (C). The compound (C) if reduced with LiAlH4 produce (D).
(a) Define Markovnikov's rule.
(b) Identify A, B, C and D with chemical reaction.
(c) How would you convert (B) into C_3H_6?
(d) What product would you expect when (A) is heated with sodium metal in dry ether?
(e) What product would you expect when C_3H_6 is treated with HBr in the presence of an organic peroxide?   (1+4+1+1+1)

21. Define the terms: (i) Solubility product (K_{sp}) (ii) Common ion effect. Explain the solubility product principle and common ion effect in the analysis of group IIIA metal cations. What will be the resulting p^H when 200 ml of aqueous solution of HCl ($p^H =2$) is mixed with 300 ml of an aqueous solution NaOH ($p^H = 12$).

(1+1+3+3)

OR

Define rate law. Differentiate between order and molecularity of a reaction.

For a reaction $A + B \rightarrow AB$, following data are obtained.

Expt. No.	[A] mol L^{-1}	[B] mol L^{-1}	Initial rate (Mol $L^{-1}sec^{-1}$)
1	0.5	0.5	$1.6×10^{-4}$
2	0.5	1.0	$3.2×10^{-4}$
3	1.0	1.0	$3.2×10^{-4}$

(i) Determine the order of reaction with respect to A and B, and overall order of reaction.
(ii) What is initial rate if [A]=2.0 mol L^{-1} and [B] = 4.0 mol L^{-1}.

22. What are phenols? How are $1°$, $2°$ and $3°$ amines separated from their mixture by Hoffmann's method?

(2+6)