ARMY Public

HALF YEARLY EXAM (2016-17)
CLASS - XII
SUBJECT : CHEMISTRY

Time : 3 Hrs **M.M. : 70**

General Instructions

- All questions are compulsory.
- Question no. 1 to 5 are very short answer questions and carry 1 mark each.
- Question no. 6 to 10 are short answer questions and carry 2 marks each.
- Question no. 11 to 22 are also short answer questions and carry 3 marks each.
- Question no. 23 is a value based question carrying 4 marks. Answer accordingly.
- Question no. 24 to 26 are long answer questions and carry 5 marks each.
- Use log tables if necessary.

1. What is name given to the linkage which holds together two monomeric units in polysaccharide? (1)

2. Name the compound in which Frenkel and Schottky defects are present together. (1)

3. Define Ebullioscopic constant. (1)

4. A galvanic cell has electrode potential of 1.1 V.If an opposing potential of 1.1 volt is applied to this cell, what will happen to the cell reaction and current flowing through the cell? (1)

5. Give reason to explain why ClF_3 exists but FCl_3 does not. (1)

6. a. Which alkyl halide from the following pairs would you expect to react more rapidly by an S_N^2 mechanism and why? 1-bromobutane OR 2-bromobutane

   b. Racemisation occurs in S_N^1 reactions; why? (2)

7. Write the structure of the major organic product in each of the following reactions:

a. $(CH_3)_2CH\text{-}CH(Br)CH_2CH_3 \xrightarrow[\Delta]{KOH/C_2H_5OH}$

b. $CH_3CH_2Cl + SbF_3 \xrightarrow{\Delta}$ **(2)**

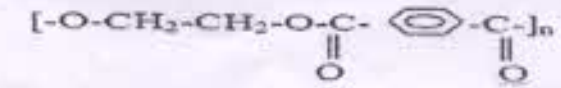
8. Explain with example:

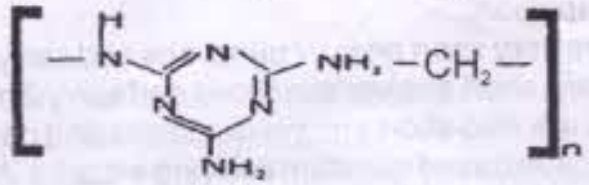
   a. Kolbe's reaction b. Williamson's Synthesis of ether (2)

9. a. Write the structure of the monomer used for getting the polymer Teflon.
   b. What is a biodegradable polymer? Give example.

OR

Identify the monomers in the following structures and write their names: (2)

(i) 

(ii) 

10. Account for the following:
    a. NO_2 dimerise to form N_2O_4.
    b. PCl_3 fumes in moisture. (2)

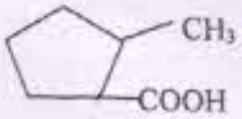
11. What happens when:
    a. Bromobenzene is treated with CH_3COCl in presence of anhydrous $AlCl_3$
    b. Methyl Chloride is treated with KNO_2
    c. 2,4,6- Trinitrochlorobenzene is subjected to hydrolysis. (3)

12. a Give one chemical test to distinguish between Phenol and Benzoic acid
    b. Write the mechanism of the reaction of HI with methoxymethane. (1+2)

OR

    a. Write the mechanism of hydration of ethene to yield ethanol.
    b. How will you synthesize 1,3,5Tribromo benzene from Phenol? (2+1)

13. a. Draw the structure of 2,4-Dinitrophenylhydrazone of benzaldehyde
    b. Write the IUPAC name of the following compound.



    c. Which acid is stronger CH_3COOH OR CH_2FCOOH and why? (3)

14. a. Arrange the following:
    i. In decreasing order of pK_b values: $C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$, $C_6H_5NH_2$
    ii. In increasing order of boiling point: C_2H_5OH, $(CH_3)_2NH$, $C_2H_5NH_2$
    b. Write the reaction for Gabriel phthalimide synthesis. (2+1)

15. a. Accomplish the following conversions:

i. Hexanenitrile to 1-aminopentane

ii. Aniline to 2,4,6-tribromo fluorobenzene

b. Aniline does not undergo Friedel -Crafts reaction. Why? (3)

16. a. Explain the structural difference between Novolac and Bakelite.

b. How is Nylon-6 prepared from its monomer?

c. What is the function of sulphur in vulcanization of rubber? (3)

17. a. In Corundum, O^{2-} ions form hcp and Al^{3+} occupy two third of octahedral voids. Determine the formula of corundum..

b. An element crystallizes in a cubic close packed structure having a fcc unit cell of an edge 200 pm. Calculate the density if 200 g of this element contains 24×10^{23} atoms. (1+2)

18. a. Classify each of the following as either a p-type or n-type semi-conductor.

i. Ge doped with In

ii. B doped with Si

b. Zinc oxide is white but it turns yellow on heating. Explain.

c. If AgCl is doped with 10^{-3} mol% $CdCl_2$. What is the concentration of cation vacancies? (3)

19. a. Will the elevation in boiling point be same if 0.1 mol of Sodium chloride or 0.1 mol of sugar is dissolved in 1L of water? Explain.

b. The freezing point of a solution composed of 5.85 g of NaCl in 100 g of water is -3.348^0C. Calculate the van't Hoff factor 'i' for this solution. [K_f (water) = 1.86K Kg mol^{-1}, Atomic masses of Na =23u , Cl = 35.5u] (1+2)

20. a. On mixing liquid X and liquid Y, volume of the resulting solution decreases.

i. What type of deviation from Raoult's law is shown by the resulting solution?

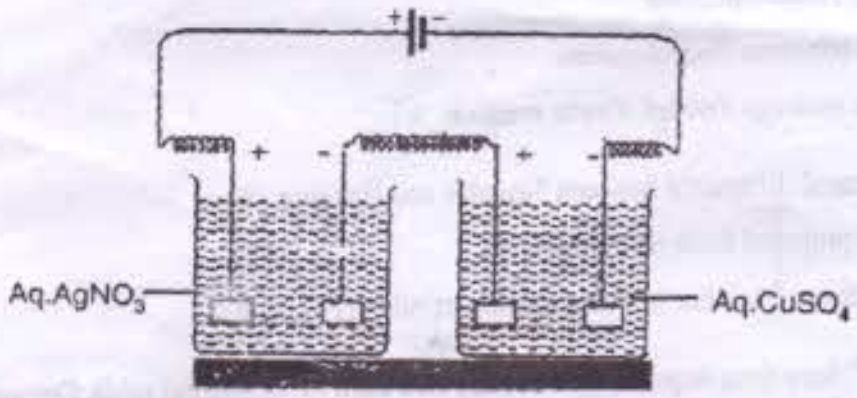
ii. What change in temperature would you observe after mixing liquids X and Y?

b. Define azeotrope.

c. Why do scuba divers use air diluted with helium? (3)

21. a. Describe the composition of anode and cathode in a mercury cell. Why does it provide constant voltage throughout its life?

b. The following figure shows two electrolytic cells connected in series.



If three faraday of electricity is passed through these cells, what is the mole ratio of Ag and Cu deposited on respective cathodes? (2+1)

22. A galvanic cell consists of a metallic zinc plate immersed in 0.1M $Zn(NO_3)_2$ solution and metallic plate of lead in 0.02M $Pb(NO_3)_2$ solution. Calculate the emf of the cell.
Write the chemical equation for the electrode reactions and represent the cell. (3)
(Given: $E_{Zn^{2+}/Zn}^{\circ} = -0.76$ V; $E_{Pb^{2+}/Pb}^{\circ} = -0.13$ V, log 5 = 0.6989)

23. Mr. Aloke works in a multinational company. He is stressed due to his hectic schedule. Mr. Amit, his friend , comes to know that he has started taking sleeping pills without consulting the doctor. Mr. Amit requests Mr. Aloke to stop this practice and takes him to a yoga centre. With regular yoga sessions, Mr. Aloke is now happy and relaxed man.

After reading the above passage, answer the following questions:

a. Write the values shown by Mr. Amit.

b. Which class of drugs is used in sleeping pills? Give one example.

c. Why is it not advisable to take sleeping pills without consultation with the doctor? (4)

24. a..Give reason:

i. Carboxylic acids do not give reactions of carbonyl group.

ii. p-nitrobenzaldehyde is more reactive than benzaldehyde towards nucleophilic addition reactions.

b.An organic compound (A) $\{C_8H_{16}O_2\}$ was hydrolysed with dilute sulphuric acid to give a carboxylic acid (B)and an alcohol (C).Oxidation of (C)with chromic acid produced (B).(C) on dehydration gives but-1-ene .Identity A,B,C and write their names. (2+3)

OR

a. Why HCOOH does not give HVZ reaction while CH_3COOH does?

b.Name the reaction and the reagent used for the conversion of acid chlorides to the corresponding aldehydes.

c.How will you bring about the following conversions in not more than two steps:

i. Propanal to Butanone

ii. Propanoic acid to prop-2-enoic acid

iii. Ethanol to 3-Hydroxybutanal. (1+1+3)

25. a. What happens when D-glucose is treated with the following reagents?

i. HI

ii. Bromine water

iii. conc. HNO_3

b. How do you explain the amphoteric behaviour of amino acids?

c. What is the difference between a nucleoside and a nucleotide? (3+1+1)

OR

a. Which sugar is called invert sugar? Why is it called so?

b. Draw the structure of α-D(+)- Glucopyranose.

c. Describe the tertiary structure of protein.

d. Write the main structural difference between DNA and RNA. (2+1+1+1)

26. a. Draw the structures of the following:

i. $H_4P_2O_7$(pyrophosphoric acid) ii. XeO_3

b. Complete the following reactions:

i. $ZnSO_4 + NH_4OH \rightarrow$

ii. $PCl_5 + H_2O \rightarrow$

c. Explain why bleaching of flowers by Cl_2 is permanent, while that by SO_2 is temporary. (2+2+1)

OR

a. Draw the structures of the following:

i.$HClO_4$(Perchloric acid) ii. $H_2S_2O_7$ (Pyrosulphuric acid)

b. Account for the following:

i. Interhalogens are more reactive than pure halogens

ii. N_2 is less reactive at room temperature.

c. What happens when (Give equation only)

Chlorine gas is passed through hot conc NaOH solution.

(2+2+1)