# Gandaki Boarding School

(Regional School)
Lamachaur, Pokhara

## SEND UP EXAMINATIONS, 2076

Class: 12 Full Mark: 75
Subject: Chemistry Time: 3:00 hours

*Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.*

### Group A

**Attempt any FIFTEEN questions*:***

1. Draw orbital diagram of ethylene molecule showing and bonds. Write any two aspects in which covalent bond differ from covalent bond.
2. A commercial bottle of conc. Sulphuric acid is labeled with specific gravity 1.84 and 98% of $H_2SO_4$ by weight. What volume of this sample is required to prepare 2 litres of N/2 $H_2SO_4$ solution?
3. What is ionic product of water? Find the hydroxyl ion concentration present in the solution having pH 7.5 .
4. Define the term electrochemical equivalent. A current of 10 ampere is passed through solution of metal chloride for one hour. The amount of metal deposited at cathode is 4.476 gm. Find the equivalent weight of metal.
5. Find the heat of combustion of methane if standard enthalpies of formation of $CH_4$, $CO_2$ and $H_2O$ are -74.85 KJ/mol, -393.50 KJ/mol, and -286.0 KJ/mol resp.
6. What are spontaneous processes? How is spontaneity related with entropy change and enthalpy change of the system?
7. Define activation energy. Draw energy profile diagram to explain the effect of catalyst in the rate of reaction.
8. Why benzene is an aromatic compound as per Huckel's rule? Benzene even being unsaturated hydrocarbon, prefers electrophilic substitution reactions than addition reactions, why?
9. Identify the major products; A, B, C, D.

i. $CH_3CH_2Br \xrightarrow[A]{+\ alc.KOH\ /\ \Delta} \xrightarrow[B]{i)\ O3\ ,\ ii)\ Zn/\ H2O}$

ii. $CH_3CH_2CH_2Br \xrightarrow[C]{+\ Mg\ /dry\ ether} \xrightarrow[D]{+\ H2O}$

10. Convert phenol into i) m-nitro benzoic acid ii) anisole
11. Write the structure and name of any unsymmetrical ether which is an isomer of Butan-1-ol. Also write a chemical reaction for its preparation by Williamson's synthesis method.
12. An organic compound $C_3H_6O$ give yellow ppt. with NaOH and $I_2$ but it does not give silver mirror with Tollen's reagent. Identify the compound and the reaction involved.
13. What happens when benzoic acid is heated with i)$NH_3$ ii) ethanol in presence of conc. $H_2SO_4$?
14. Starting from nitrobenzene how would you obtain- i) p-hydroxyazobenzene ii) hydrazobenzene?
15. Write $1^0$, $2^0$ and $3^0$ isomers of $C_3H_9N$. Arrange them with increasing order of their basicity.
16. What are sugars and non-sugars? Write with example.
17. What are proteins? What happens when protein is - i) heated ii) hydrolyzed ?
18. Write the differences between homopolymer and co-polymer with an example of each.
19. Write the main function of each-
    i) Antipyretics ii) insecticides iii) nitrogenous fertilizers iv) Antibiotics
20. What is Nessler's reagent? How it is prepared?
21. Write molecular formula of -
    i. Calomel ii. Red oxide iii. Lunar caustic iv. White vitriol
22. How wrought iron differ from cast iron? What is meant by quenched steel?

## Group B

**Attempt any FIVE questions:**

23. What is meant by titration? Does standardization meant for titration? Write in support of your answer. 3.5 gm of chalk is dissolved in 75ml of 0.95N HCl. The solution of acid is then titrated with 1N NaOH whose 9.0ml is consumed. Find the percentage of $CaCO_3$ in the chalk sample. (1+1+3)

24. What is the solubility product principle? When the solution 0.05 M $Al_2(SO_4)_3$ and 0.04M $Fe_2(SO_4)_3$ is treated with $NH_4OH$ in presence of $NH_4Cl$ then the molar concentration of $OH^-$ is found to be $3.0x10^{-11}$ M. Among $Al(OH)_3$ and $Fe(OH)_3$ which will precipitate from the solution? (Given: Ksp of $Al(OH)_3$ =$2.0x10^{-32}$ , Ksp of $Fe(OH)_3$ = $6.8x10^{-38}$ ) (1+4)

25. Define rate law equation. For the hypothetical reaction; $2A + B_2 \rightarrow 2AB$ , following data is observed;

| Expt. No. | [A] mol/L | [B] mol/L | Rate of reaction (mol $L^{-1}$ $sec^{-1}$ ) |
|---|---|---|---|
| 1 | 0.5 | 0.5 | 1.6 $X10^{-4}$ |
| 2 | 0.5 | 1.0 | 3.2 $X10^{-4}$ |
| 3 | 1.0 | 1.0 | 3.2 $X10^{-4}$ |

i. Express the actual rate law equation for this reaction by finding order with respect to each reactant.

ii. Calculate the rate of formation of product AB when [A]=2.0 mol/L and [B]=4.0 mol/L. (1+2+2)

26. Describe laboratory preparation method of trichloromethane with well labeled diagram. Why trichloromethane is stored in dark brown bottle with little ethyl alcohol? (4+1)

27. Write any two methods of preparation of acetic acid. What happens when acetic acid is heated with i) $P_2O_5$ ii) HI and red $P_4$? Write a suitable chemical test that help to distinguish acetic acid and formic acid. (2+2+1)

28. An organic compound **A** can reduces Tollen's reagent. On oxidation with potassium permanganate give compound **B** having same number of carbon as that of **A**. On reaction of **B** with ethanol in presence of conc. sulphuric acid give an ester **C** having molecular formula $C_4H_8O_2$. Identify **A**,**B**,**C** with their IUPAC names and chemical reactions involved.

29. Describe the methods of extraction of zinc from zinc blende ore.

## Group C

**Attempt any TWO questions:**

30. i. What are electrochemical cells? How they differ from electrolytic cells? Construct a galvanic cell indicating cathode and anode, in which following reaction occur;

$Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$ (1+2+2)

ii. What is single electrode potential? Explain how it is originated? Predict whether the following reaction; $Zn^{2+} + 2Fe^{2+} \rightarrow Zn + 2Fe^{3+}$ will occur or not ? Can we store zinc sulphate solution in an iron vessel? (Given: $E^0$ $Zn^{2+}/Zn$ = -0.76 , $E^0$ $Fe^{3+}/Fe^{2+}$= +0.77V , $E^0$ $Fe^{2+}/Fe$= -0.44V) (1+2+1+1)

31. Explain how aniline is prepared in laboratory ? Compare the basic nature of aniline with ethanamine. Write a suitable chemical test that help to distinguish aniline from ethanamine. Why $-NH_2$ group of aniline is ortho and para directing towards electrophilic substitution reaction? Give reason why $-NH_2$ group of aniline be protected before nitration? (4+1+1+2+2)

32. i. Write an example of the following reactions: (5x1)

a. Aldol condensation
b. Cannizaro's reaction
c. Clemmensen reduction
d. Decarboxylation reaction
e. Hoffmann's bromamide reaction

ii. Identify the major products:

$$\xrightarrow[\text{Conc.H2SO4}]{\text{Conc.HNO3}} \qquad \text{Sn/Conc.HCl} \qquad \text{CHCl3+ KOH/}\Delta \qquad \text{LiAlH4}$$

**A** **B** **C** **D** **E**

Where compound **A** is obtained by heating phenol with Zn dust.

33. Write short notes on (any two): (2x5=10)

i. Factors affecting rate of chemical reaction

ii. Hess' law of constant heat summation and its applications.

iii. Victor Meyer's method of distinction of $1^0$, $2^0$ and $3^0$ alcohol.

iv. Chemistry of blue vitriol

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