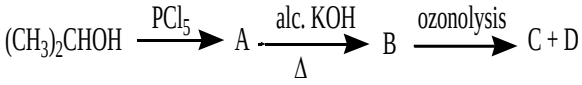
**NEB**
**Model Question**

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

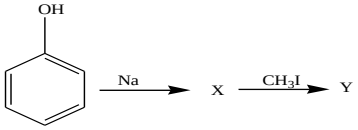
**Group – A**

**Attempt any fifteen questions.** **15×2 = 30**

1. What is the mode of hybridization of the central atom whose molecular geometry is tetrahedral? And give an example of it.
2. How would you convert Chlorobenzene into:
    A. DDT
    B. Toluene
3. Identify the organic compound A ,B , C and D.




4. Why is phenol more acidic than aliphatic alcohol?
5. Name the compound X and Y in the following reaction.




6. Write a reaction of each of the following:
    A. Tollen's test
    B. Cannizaro's reaction
7. What is decarbonylation reaction? Write an example of it.
8. How is benzoic acid prepared from benzene?
9. Explain why is $-NO_2$ group a meta directing group towards electrophilic aromatic substitution?
10. Why is $-NH_2$ group of aniline protected before nitration?
11. What is difference between essential and non-essential amino acids?
12. Distinguish between antibiotic and antiseptics with one example of each.
13. Can a solution of 1M $CuSO_4$ be stored in a vessel made of nickel metal? If not, why?
14. What are the limitations of first law of thermodynamics?
15. Write an example of each of the following reactions
    A. Aldol condensation
    B. Wolffkishner reduction
16. What is normality? How is it related with molarity?
17. What volume of decinormal solution of HCl is required to neutralize 25 ml NaOH containing 8 gmNaOH in 1 litre solution? Ans: 50 ml
18. Mention two alloys of Zinc and Mercury.
19. The half life period of first order reaction is 2 hrs. Find the time required to complete 87.5% of the reaction? Ans: 6 hrs
20. What is meant by peptide bond? Write the structure of dipeptide.
21. How would you prepare primary alcohol from oxo process?
22. Why it is dangerous to boil sample of ether stored for a long time?

**Group – B**

**Attempt any five questions:** **5 × 5 = 25**

23. How is trichloromethane prepared in laboratory? How does it react with propanone?
24. What is meant by Grignard's reagent? How could you convert a primary alcohol to Grignard's reagent? By using a suitable Grignard's reagent how would you synthesize:
    A. 2-methyl propan-2-ol
    B. Ethanoic acid
25. How is phenol prepared from (a) aniline and (b) benzene? How do you explain that the OH group of phenol is ortho/para directing?
26. What happens when?
    A. methanoic acid is warmed with ammonical silver nitrate.
    B. benzoic acid is nitrated?
27. Define free energy. Derive an expression to relate Gibbs free energy change with work.

28. State Faraday's first law of electrolysis. What current is required to deposit whole copper from 1 litre of 1M $CuSO_4$ solution by passing electricity through it in 10 minute? Ans: 321.6 A
29. How is zinc extracted from its ore?

**Group – C**

**Attempt any two questions:** **2 × 10 = 20**

30. How is nitro benzene prepared in laboratory? Give its reduction in different media.
31. What are amines? How are they classified? Describe a suitable method for the separation of amines from their mixtures. How could you convert :
    A. Methanmine to ethanamine and vice versa.
    B. Ethane to ethanoic acid.
32. Define indicator. Explain how are indicators selected in acid base titration? Describe with pH curve.
33. What is half life period? Rate constant for a first order is $5.48x10^{-4}s^{-1}$.Find the time period to complete $2/3^{rd}$ of the reaction. Ans: 2005 Sec

**<<<THE END>>>**

**NEB**
**Model Question**

***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.** **15×2 = 30**

1. How many sigma and pi bonds are present in 1, 3 butadiene?
2. Name the hydrolytic products of sucrose. Also give their cyclic structure.
3. What is peptide bond? What type of compounds has such bonds?
4. Give the name and structure and of antipyretic and analgesic drugs.
5. What are the natural and synthetic dyes? Write a structure of synthetic dye.
6. Why is methanoic acid is stronger acid than ethanoic acid?
7. Explain why nucleophilic substitution reaction difficult in haloarene than in haloethane.
8. Write an example of each of the following reaction:
    a. Carbylamine reaction
    b. Tollen's reagent test
9. Why ethyl amine is stronger base than ammonia?
10. Identify X and Y in the following reaction

$$X \xrightarrow{PCl_5} Y \xrightarrow{CH_3NH_2} \text{N - methyl- propanamide.}$$

11. What happens when;
    a. Aniline is sulphonated
    b. Phenol is diazotized
12. What happens when ethanol is warmed with aqueous KOH and $I_2$?
13. Name the product that obtained by heating n-propanol with
    a. $PCl_5$
    b. $H_2SO_4$ (170°C)
14. Calculate the pH of 100 ml of 0.2 N NaOHsolutions. Ans: pH 13.30
15. Sketch the potential energy diagram for exothermic and endothermic reaction.
16. Predict the enthalpy change, free energy change and entropy change when $NH_4Cl$ is dissolved in water and the solution becomes colder.
17. Justify the statement that $NH_3$ is both Bronsted base as well as Lewis Base.
18. How does molar conductance of strong electrolyte vary with its dilution in solution?
19. What is meant by galvanization?
20. What happens when;
    a. A piece of tin is boiled with KOH.
    b. White vitriol is heated gently and then strongly.

**Group – B**

**Attempt any five questions:** **5 × 5 = 25**

21. One gram of a metal was dissolved in 25ml of 2N $H_2SO_4$ (f = 1.01). The excess of acid required 15.1 ml of 1 N NaOH( f = 0.8 ) for complete neutralization. Calculate the equivalent mass of metal. Ans: 26
22. How would you distinguish primary, secondary and tertiary alcohol by victor Meyer's method?
23. Convert: a. n-propyl alcohol to isopropyl alcohol. b. 2 - bromopropane to 1 – bromopropane.
24. State Faraday's law of electrolysis. Calculate the mass of copper deposited by reduction of copper (II) ions during the passage of 2.5 ampere current through a solution of copper (II) sulphate for 45 minutes.
    Ans: 2.2 gram
25. Describe with labeled diagram the preparation of dry ether in laboratory.
26. State Hess's law of constant heat summation. Calculate the heat of formation of Naphthalene [$C_{10}H_8$ (s)] from the following data: Enthalpies of combustion of carbon, hydrogen and $C_{10}H_8$ (s) are -94.05, -66.3 and -1231.6 kcal respectively.
    Ans: 25.91 KCal
27. How is steel manufactured by open hearth process? What is meant by quenched steel?

**Group – C**

**Attempt any two questions:** **2 × 10 = 20**

28. Describe the preparation of pure and dry nitrobenzene in the laboratory. Why does it give meta substituted product during electrophilic substitution? Convert nitrobenzene to salicylic acid.
29. a) An organic compound having molecular formula $C_5H_{10}O$ reacts with hydrogen cyanide and phenyl hydrazine to form cynohydrin and phenyl hydrazone respectively. It does not give iodoform test but gives red ppt with Fehling's solution. It also gives n – pentene in Clemmension reduction. Identify that compound with all reactions.
    b) i) Nitration of aniline in ortho and para position. ii) Starting from $C_6H_6$ how will you obtained phenol?
30. a) Define Ostwald's dilution law. Calculate the pH of 0.1 M $CH_3COOH$ solution. If dissociation constant of $CH_3COOH$ is $1.8 \times 10^{-5}$. Ans: pH 2.8
    b) Define half life of reaction. For a first order reaction the half life of the reaction is 100 second. How long will it take for the reaction to be completed 75%? Ans: 200.07 sec
31. Write short notes on (any two):
    I. Extraction of zinc
    II. Common ion effect.
    III. Chemistry of Blue Vitriol.
    IV. Method of separation of primary, secondary and tertiary amines by Hofmann's method.

**<<<THE END>>>**

**NEB**

**Model Question**

***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:*** ***15 × 2 = 30***

1. How many sigma and pi bonds are present in 1, 3 butadiene?
2. What is azodye? Give an example of azodye with its structure.
3. What is soap? How is soap obtained from fat?
4. Give the structure of following organic compounds mentioning one important uses of each:
   i) Paracetamol ii) DDT
5. What is protein? Write an important uses of protein.
6. What are gem-dihalides? What happens when these halides are hydrolyzed with an aqueous KOH?
7. An overworked teacher placed 1- propanol and n-propyl ether in two different bottles, but forgets to lebel them. What simple test be performed on a sample from each of the bottles to identify them.
8. An organic compound (A) $C_3H_8O$, on oxidation gives (B), $C_3H_6O$. What functional group is present in B. Write possible structure of B.
9. Write an example of each of the following reaction:
   i) Cannizaro reaction ii) Perkin reaction
10. What happens when benzene reacts with acetyl chloride? Name this reaction.
11. Why is phenol more acidic than ethanol?
12. An organic compound X having molecular mass 46 is heated with iodine in presence of aqueous NaOH gave a compound, Y. The compound Y reacts with heated silver to produce ethyne. Identify X and Y.
13. What happens when aniline and ethylamine are separately treated with $NaNO_2$ and dil. HCl in ice cold temperature?
14. Calculate the pH of 100ml of 0.2N $H_2SO_4$ solution. Ans: pH 1
15. What is half life of a reaction? For a first order reaction, how is it related to its rate constant?
16. Predict the enthalpy change, free energy change, and entropy change when $NH_4Cl$ is dissolved in water and the solution becomes colder.
17. Justify the statement that water is a Lewis base and as well as a Bronsted acid.
18. Standard electrode potential value can be applied to predict the direction of metal displacement. Explain.
19. How would you obtain calomel from corrosive sublimate and vice versa?
20. What is meant by tempering of steel?

**Group B**

***Attempt any five questions:*** ***5 × 5 = 25***

21. A solution of 2.5 gm of a sample of $Na_2CO_3$ contaminated with salt was treated with N/2 HCl of which 55 ml were required for neutralization. Calculate the % of anhydrous $Na_2CO_3$ in the sample. Ans: 58%
22. Write the steps of chemical reactions involved in the preparation of hydrated formic acid. How is anhydrous formic acid obtained from it?
23. Describe Hoffmann's method for the separation of primary, secondary and tertiary amines.
24. Convert ethanol to methanol and vice versa.
25. State Faraday's law of electrolysis. How long a current of 3 ampere has to be passed through a solution of $AgNO_3$ to coat a metal surface of 80 $cm^2$ with 0.005 mm thick layer? (Density of Ag = 10.5 $gm/cc^{-1}$) Ans: 126.09 sec
26. What is rusting of iron? Describe the electrochemical theory of rusting of iron.
27. State Hess's law of constant heat summation. The bond association energy of HCl, $H_2$ and $Cl_2$ are 103, 104 and 58 K cal $mol^{-1}$ respectively. Calculate the enthalpy of formation of HCl gas. Ans: -22Kcal $mol^{-1}$

**Group C**

***Attempt any two questions:*** ***10 × 2 = 20***

28. Describe with a neat labeled diagram how chloroform is prepared in laboratory in pure and dry state? What happens when chloroform reacts with:
   i) Acetone ii) $O_2$ in the presence of sunlight iii) silver powder iv) aq. NaOH v) conc. $HNO_3$
29. a) i) Nitration of aniline in ortho and para position.
   ii) Starting from $C_6H_6$ how will you obtained phenol?
   b) An organic compound having molecular formula $C_5H_{10}O$ reacts with hydrogen cyanide and phenyl hydrazine to form cynohydrin and phenyl hydrazone respectively. It does not give iodoform test but gives red ppt with Fehling's solution. It also gives n-pentane in Clemension reduction. Identify that compound with all reactions.

30. a) Define solubility product constant. The solubility product of $BaSO_4$ is $1.5 \times 10^{-4}$ calculate the concentration of $H_2SO_4$ to get precipitation in 0.1M $Ba^{++}$ solution on adding $H_2SO_4$.Ans: $10^{-6}$M

b) $2NO_2(g) \longrightarrow 2NO(g) + O_2(g)$.

Given the following results:

| Experiment No. | $[NO_2]$ | Initial rate mol $s^{-1}$ |
|---|---|---|
| 1 | 0.01 | $7.0 \times 10^{-5}$ |
| 2 | 0.02 | $28 \times 10^{-5}$ |

Find the rate law, rate constant and order of reaction. Calculate the half life of reaction too. Ans: $R = K[NO]^2$, K = 0.7 L/mole.sec, 2nd order, 0.99 sec

31. Write short notes on ( any two ):
    - i) Extraction of zinc from its ore.
    - ii) Common ion effect.
    - iii) Factors affecting the rate of reaction.
    - iv) Laboratory method of preparation of ethoxy ethane.

**<<<THE END>>>**

**NEB**

**Model Question**

***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:*** ***15 × 2 = 30***

1. Predict the molecular geometry of $NH_3$ and $H_2O$ based on VSEPR Theory.
2. Convert propane-1-ol to propan-2-ol and vice versa.
3. How is iodo-ethane converted to (a) ethene and (b) ethanol.
4. Write an example of each of the following reaction:
   a) Wolf-Kishner's reaction
   b) Hoffman's hypobromide reaction
5. Expalin:
   a) The boiling point of ether is less than its isomeric alcohol.
   b) Aliphatic amines are more basic than aromatic amines
6. Chlorobenzene is ortho-para orienting while benzaldehyde is meta orienting towords the electrophilic substitution reactions. Explain.
7. What happens when the product obtained from calcium ethanoate and calcium methanoate is warmed with Tollen's reagent?
8. Identify A and B with their structure:

a. Aniline $\xrightarrow[\text{Cold}]{HNO_2/NaCl}$ A $\xrightarrow[\Delta]{CuCl + HCl}$ B

b. Phenol $\xrightarrow[\Delta]{\text{Zn dust}}$ A $\xrightarrow[AlCl_3]{CH_3COCl}$ B

9. Write an example each of the following:
   a. Lipids
   b. Monosaccharide
10. Write any two differences between RNA and DNA.
11. Write the formulae of DDT and BHC. Write their uses.
12. What is polymerization? Give an example of synthetic and natural polymers.
13. Find the normality of 36% hydrochloric acid by mass having specific gravity 1.18. Ans: 11.5N
14. Define Bronsted acid and base giving an example of each.
15. Distinguished between internal energy and enthalpy.
16. Define rate constant and half life of a reaction.
17. Calculate the hydroxide ion concentration of a solution having pH 9.5 Ans: $3.16\times 10^{-5}$ M
18. How single electrode potential is originated?
19. Convert corrosive sublimate to calomel and vice versa.
20. Give important ore of copper.

**Group B**

***Attempt any five questions:*** ***5 × 5 = 25***

21. How is nitrobenzene prepared in laboratory? What products are obtained when nitrobenzene is reduced in acid and neutral media?
22. How 1°, 2°and 3° amines separated from their mixture by Hoffman's method?
23. What happens when:
   a. Ethanol is treated with dilute alkali
   b. Ethanoic acid is heated in presence of $P_2O_5$
   c. Phenol is refluxed with chloroform in the presence of aqueous NaOH
   d. Aniline is treated with bromine water
   e. Ethoxy ethane is heated with phosphorous pentachloride
24. Define ionization constant and degree of ionization of a weak electrolyte. What is the effect of temperature of concentration upon them?
25. State and explain second law of thermodynamics.
26. a) How are indicators seleted in the following titration:
   i) Strong acid strong base titration
   ii) Strong acid weak base titration

b) X ml of 0.1 N NaOH solution react with 200 ml of Y N HCl to form 0.1 g equivalent of salt. Find the value of X and Y. Ans: x = 1000ml, y= 0.5 N

**27.** How is pure mercury extracted from cinnabar? What is the action of mercury upon concentrated sulphuric acid?

**Group C**

***Attempt any two questions:*** ***2 × 10 = 20***

28. Describe the laboratory preparation of pure aniline. Write the action of aniline upon:
    a. $NaNO_2$ and HCl in cold
    b. Chloroform in alcoholic KOH solution in hot
    c. Hot conc. $H_2SO_4$
    d. Benzene diazonium chloride in alkali
29. a) Show your familiarity with the following:
    I. Oxo process
    II. Reimer Tiemann reaction
    III. Perkin reaction
    IV. Benzoin condensation
    V. Cannizzaro's reaction

    b) Carry out the following conversions:
    I. Ethanol to propanone
    II. Aniline to benzoic acid
30. a) State and explain Faraday's laws of electrolysis. Show that the quantity of electric charge carried by 1 mole of electrons is one Faraday.

    b) A metal plate having surface area 200 $cm^2$ is copper plated with a uniform thickness by passing 5 ampere of current in $CuSO_4$ solution for an hour. Calculate the thickness of Cu deposited given the specific gravity of Cu = 8.9. Ans: $3.33 \times 10^{-3}$ cm
31. Write short notes on: ( any two )
    a. Manufacture of steel by open hearth process
    b. Chemistry of white vitriol
    c. Victor Meyer's test of $1^o$, $2^o$ and $3^o$ alcohols
    d. Thermodynamic criteria for feasibility of reaction

**<<<THE END>>>**