Sub.Code : 3021'D'

NEB - GRADE XII
2083 (2026)
Chemistry

(For the regular and partial general stream's students whose first two digits of registration number starts from 79, 80, 81 and 82)

Multiple Choice Questions

Attempt all the questions.

Group 'A'

Rewrite the correct option of each question in your answer sheet.[11×1=11]

1. Which order of reaction does the following chemical equation represent?
   $RCOOR + H_2O \xrightarrow{H^+} RCOOH + ROH$
   A) Zero order B) Pseudo-first order
   C) Second order D) Third order
2. What is the normality of 5% Na_2CO_3 solution?
   A) 0.94 N B) 0.98 N C) 0.99 N D) 1.01 N
3. Which of the following is the ionic product of water at 393 K?
   A) Greater than 1×10^{-14} B) Less than 1×10^{-14}
   C) Equal to 1×10^{-14} D) Equal to 1×10^{-7}
4. For what purpose is the hydrogen- oxygen fuel cell used in spacecraft?
   A) Power for heat and light B) Power for pressure
   C) Power for propellation D) Power for uplift
5. Which of the following indicates lithophone?
   A) $ZnS + BaSO_4$ B) $ZnSO_4 + BaSO_4$
   C) $ZnCO_3 + BaS$ D) $ZnS + BaSO_3$
6. Which of the following is the purest form of iron ?
   A) Cast iron B) Steel C) Haematite D) Wrought iron
7. Nitrobenzene can be prepared from benzene by using a mixture of conc. nitric acid and conc. H_2SO_4 in the nitrating mixture. What is the role of nitric acid?
   A) A base B) An acid C) A catalyst D) A reducing agent

Contd...

8. You are given (I) aniline (II) o-nitro aniline (III) P-nitro aniline and (IV) m-nitroaniline. What is the order of increasing basic nature ?

A) II < I < III < IV B) I < II < III < IV

C) II < III < I < IV D) II < III < IV < I

9. Which of the following mechanisms can occur in the hydrolysis of isopropyl chloride ?

A) SN^1 Mechanism B) SN^2 Mechanism

C) SN^1 and SN^2 Mechanism D) Neither SN^1 nor SN^2 Mechanism

10. What would be the product when benzaldehyde is heated with conc.NaOH?

A)Benzyl alcohol and sodium benzoate

B) Sodium benzoate and benzaldehyde

C) Sodium benzoate and benzene

D) Benzyl alcohol and benzene

11. A compound 'X' undergoes reduction with $LiAlH_4$ to yield 'Y' . When 'Y' is passed over copper heated to 300°C, 'X' is formed. What is 'Y' ?

A) Acetone B) Ethanal C) Ethanol D) Ethoxyethane

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

Time: 3 hrs. **Full Marks: 75**

Attempt all the questions.

Group 'A' **[11×1=11]**

Question No. 1 to 11 (Multiple Choice Questions) will be provided after 30 minutes of starting examination. Rewrite its (MCQ) correct option (answer) in the same answer sheet.

Group 'B' **[8×5=40]**

12. a) Write any two differences between primary standard and secondary standard substance. [2]

b) 3.15 g of oxalic acid crystal ($C_2H_2O_4.2H_2O$) was dissolved in water to make 500 mL of its solution.

i) Determine the normality of the acid. [1]

ii) The acid solution became permanently pink when 400 mL of $KMnO_4$ solution (eq.wt.=31.5) was added during titration. What mass of the $KMnO_4$ is present in 1 liter of the solution? [2]

13. Why is standard hydrogen electrode called reference electrode ? [1]

An electrochemical cell connects $E^\circ_{Zn^{++}/Zn}$ electrode with standard hydrogen electrode and the emf of the cell is found to be +0.76 V.

i) Design cell notation indicating cathode and anode. [2]

ii) Write down net cell reaction. [1]

iii) What is the value of $E^\circ_{Zn^{++}/Zn}$? [1]

OR

a) State Hess's law of constant heat summation and illustrate it with an example. [2]

b) Heat of formation of CO_2 and H_2O are -94 kcal and -68 kcal, respectively. Calculate heat of reaction when 2 mole of CH_4 is formed. [3]

Contd...

14. A) Identify A and B in the following reaction sequence.

$$\text{Ⓐ} \xrightarrow{Cu_2Cl_2/H^+} C_6H_5Cl \xrightarrow[\text{Alkali}]{Ni\text{-}Al/\Delta} \text{Ⓑ}$$

i) Write down correct chemical equation to identify Ⓐ and Ⓑ. [2]

ii) What product would you obtain when Ⓐ is:

a) boiled with water? [1]

b) treated with aniline? [1]

B) What happens when C_6H_5Cl is heated with chloral? [1]

15. A list of organic compounds is given as follows:

Propanamine, ethoxyethane, ethyl cyanide, iodoethane and ethanol

Prepare a correct sequence of reaction chain from the above compounds using suitable reagents and conditions. [5]

OR

An organic compound Ⓐ gives compound Ⓑ when heated with silver powder. The compound Ⓑ undergoes hydrolysis with water in presence of dil. H_2SO_4 and 1% $HgSO_4$ to yield Ⓒ. The compound Ⓒ reacts with dilute alkali to form Ⓓ. The compound Ⓒ can also be obtained by the reduction of ethanoyl chloride with hydrogen in presence of $Pd/BaSO_4$. Identify Ⓐ, Ⓑ, Ⓒ and Ⓓ with pertinent reactions. [5]

16. Give an example of each of the following reactions. [5]

a) Tollen's test

b) Cannizzaro's reaction

c) Decarbonylation

d) Reimer-Tiemann's reaction

e) Oxo-process.

17. Starting from CH_3MgBr, how would you prepare ethanoic acid? Write the action of ethanoic acid on: [1+4]

i) NH_3 ii) $SOCl_2$ iii) P_2O_5 iv) $LiAlH_4$

18. Write the preparation, properties and uses of mercuric chloride. [1+3+1]

19. A metal having electronic configuration [Ar] $3d^{10}4s^1$ belongs with IIB of the periodic table. The metal is widely used to make electric wires and domestic cooking utensils.

a) Draw a well-labelled blast furnace for smelting the metal from its ore. [2]

b) Write down chemical reactions that occur in the smelting process. [3]

Contd...

Group 'C' [3×8=24]

20. a) Write any two differences between order and molecularity of a reaction. [2]

b) Draw a graph showing the relationship between concentration of reactant and time for a zero order reaction. [1]

c) The experimental data for a hypothetical reaction $X + Y \rightarrow Z$ is:

Expt. no	[X] $molL^{-1}$	[Y] $molL^{-1}$	initial rate, $molL^{-1}s^{-1}$
I	0.5	0.5	1.6×10^{-4}
II	0.5	1.0	3.2×10^{-4}
III	1.0	1.0	3.2×10^{-4}

Determine the rate constant and write down rate law equation from the above data. [3+1]

d) What is the order of reaction with respect to X ? [1]

OR

a) i) What is meant by weak electrolyte? [1]

ii) Derive Ostwald's dilution equation. [2]

iii) Point out any two limitations of Ostwald's dilution law. [2]

b) Predict whether precipitation will occur or not on mixing 20 mL of 1×10^{-3} N of NaCl solution with 80 mL of 1×10^{-2} N $AgNO_3$ solution if K_{sp} for AgCl = 1.5×10^{-10} . [At.wt. of Ag = 108 amu.] [3]

21. a) Explain Hoffmann's method to separate ethanamine and N-methylmethanamine from their mixture. [4]

b) What happens when: [1+1+1+1]

i) chloroform is treated with acetone in presence of aq. KOH ?

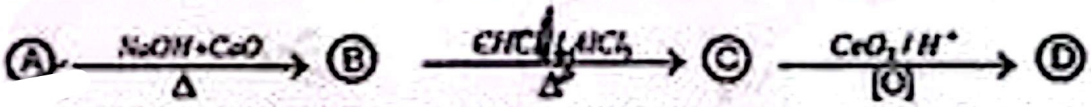
ii) ethanal reacts with 2,4–DNP ?

iii) aniline is added to ice-cold solution of sodium nitrite and hydrochloric acid?

iv) Nitro-benzene is subjected to electrolytic reduction ?

OR

a) Identify Ⓐ , Ⓑ , Ⓒ and Ⓓ in the following reaction sequence.



Compound 'C' can be obtained by Clemmensen's reduction of benzaldehyde. [1×4]

b) Explain the test of propan-1-ol and propan-2-ol by using Victor-Meyer's method in detail. [4]

Contd...

22. a) Explain the quality control system in the manufacture of portland cement. [2]

b) Give the correct structure of the following compounds. [2]

i) Aspirin ii) DDT

c) Write any two differences between paper and pulp. [2]

d) What is meant by artificial radioactivity ? Write an example of it. [1+1]

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