

## NEB-GRADE XII

2081 (2024)

## Chemistry

(New course)

(For general stream student whose first two digits of registration number starts from 78, 79 and 80)

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

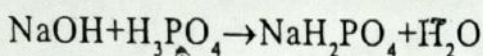
Attempt all the questions.

Group 'A'

[11×1=11] ⑤

Rewrite the correct option of each question in your answer sheet.

1. A chemical reaction occurs as follows:



What is the equivalent weight of  $\text{H}_3\text{PO}_4$ ?

- A) 25                      B) 49                      C) 59                      D) 98

2. If 0.01M solution of acetic acid is 0.01% ionised, what will be the dissociation constant of acetic acid ?

- A)  $1 \times 10^{-3}$                       B)  $1 \times 10^{-6}$                       C)  $1 \times 10^{-8}$                       D)  $1 \times 10^{-10}$

3. If the rate of reaction is equal to the rate constant, what will be the order of reaction ?

- A) Zero                      B) First                      C) Second                      D) Third

4. Standard electrode potentials of four metals P, Q, R and S are +0.34V, -0.25V, -2.93V and +0.85V, respectively. Which is the correct arrangement in the order of decreasing reactivity ?

- A)  $\text{S} > \text{P} > \text{Q} > \text{R}$     B)  $\text{Q} > \text{R} > \text{P} > \text{S}$     C)  $\text{R} > \text{Q} > \text{P} > \text{S}$     D)  $\text{R} > \text{S} > \text{Q} > \text{P}$

5. What feature of transition metals makes them suitable to act as catalyst ?

- A) Large ionic charge                      B) Variable oxidation state  
C) Highly reactive nature

**D) Large surface area for the reactant to be absorbed**

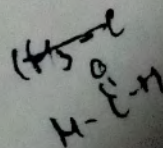
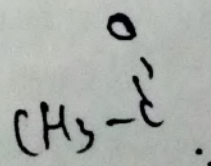
6. Which of the following metal ions shows green color in its salt ?

- A)  $\text{Ti}^{3+}$                       B)  $\text{Cr}^{3+}$                       C)  $\text{Mn}^{2+}$                       **D)  $\text{Fe}^{2+}$**

Contd...



7. Benzene  $\xrightarrow[\text{Anhy. AlCl}_3]{\text{CH}_3\text{Cl}}$  'X'  $\xrightarrow[\text{[O]}]{\text{CeO}_2/\text{H}^+}$  'Y'. If the compound 'Y' is heated with acid anhydride in the presence of sodium acetate, what will it give ?
- A) Cinnamic acid      B) Picric acid  
C) Benzoic acid      D) Phthalic acid
8. Which of the following compounds gives positive Tollen's test as well as Iodoform test ?
- A) Propanone      B) Ethanol  
C) Ethanal      D) Methanal
9. Which one of the following is most basic in nature?
- A)  $\text{NH}_3$       B)  $\text{CH}_3\text{NH}_2$       C)  $(\text{CH}_3)_2\text{NH}$       D)  $\text{C}_6\text{H}_5\text{NH}_2$
10. Which of the following compounds reacts with chlorobenzene to form DDT?
- A) Carbonyl chloride      B) Acetone      C) Chloral      D) Chloroform
11. If you are asked to prepare a primary alcohol using Grignard's reagent, what will you start with ?
- A) Methanal      B) Ethanal  
C) Propanone      D) Acetyl chloride





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Time: 3 hrs.

Full Marks: 75

Attempt all the questions.

## Group 'A'

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

## Group 'B'

[8×5=40]

Standard reduction potentials of  $\text{Cu}^{2+}/\text{Cu}$  and  $\text{Fe}^{2+}/\text{Fe}$  are +0.34V and -0.44V, respectively.

- Write down the cell notation indicating anode and cathode. [1]
- Calculate the standard emf of the cell. [2]
- Write the complete cell reaction. [2]

Or

Define heat of combustion.

Heat of combustion of carbon (s), sulphur (s) and carbon disulphide (l) are -395 KJ/mol, -295 KJ/mol and -1110 KJ/mol, respectively. Calculate the heat of formation of  $\text{CS}_2(\text{l})$ . [1+4]

- Define the term pH of a solution.

Calculate the hydroxyl ion concentration in mole/litre of a solution whose pH is 4.7. Also determine the weight of NaOH required to produce these ions in one litre of the solution. [1+4]

- A coinage metal (M) of electronic configuration (Ar)  $3d^{10}, 4s^1$  belongs to group IB in the periodic table.

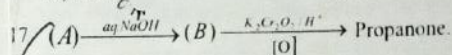
- Draw a blast furnace for the smelting process during the extraction of (M) using its chief ore. [2]
- Explain the different chemical reactions involved during the formation of matte in the furnace. [3]

- Give a reaction for the preparation of corrosive sublimate. [1]
- What is the action of corrosive sublimate with
  - KI solution
  - $\text{SnCl}_2$  solution
  - $\text{NH}_4\text{OH}$  solution?
- Mention any two important uses of corrosive sublimate. [1]

Contd...

- Starting from benzene, how would you prepare nitrobenzene? How would you convert nitrobenzene into :
  - azoxybenzene
  - p-aminophenol
  - aniline
  - azobenzene?

[1+4]



- Identify the compounds (A) and (B).
- Starting from compound (A), how would you obtain 2,3-dimethylbutane?
- Convert compound (B) into propene.
- Predict the product, when compound (A) is heated with sodium methoxide. [2+1+1+1]

Or

Make a correct sequence of reactions using the suitable conditions from the following compounds. [5]

Benzoin, Toluene, Benzene diazonium chloride, Phenol, Benzaldehyde and Benzene

- Write down a chemical equation of each of the following. [5]

- Carbonylation reaction
- Fehling's test
- Aldol condensation
- Williamson's ether synthesis
- 2, 4- DNP test

- Write an example of each of primary ( $1^\circ$ ) and secondary ( $2^\circ$ ) alcohol. How is Victor-Meyer's test applied to distinguish between them? [1+4]

## Group 'C'

[3×8=24]

- The concentration of  $\text{H}_2\text{SO}_4$  solution can be determined by the titration with standard  $\text{Na}_2\text{CO}_3$  solution.

- Is the  $\text{Na}_2\text{CO}_3$  solution a primary standard? Why? [2]
- Differentiate between equivalent point and end point. [2]
- 100 ml of  $\text{Na}_2\text{CO}_3$  solution contains 0.53 g of  $\text{Na}_2\text{CO}_3$ . If 10 ml of this solution is added to 'x' ml of water to obtain 0.01M  $\text{Na}_2\text{CO}_3$  solution, calculate the value of x. [4]

Or

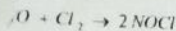
- Define half-life of a reaction. Deduce the relation that the half life for a reaction is directly proportional to the initial concentration of reactant. [1+2]

Contd...

(3)

3021'R'

reaction;



(g) (g) (g)

Expt No.	Initial [NO] M	Initial [Cl <sub>2</sub> ] M	Initial rate of disappearance of Cl <sub>2</sub> (M/min.)
1	0.15	0.15	0.60
2	0.15	0.30	1.20
3	0.30	0.15	2.40
4	0.25	0.25	x

(a) Write the expression for rate law. [2]

(b) Calculate the value of K and specify its unit. [2]

(c) Find the value of x. [1]

21. a) The vapour of organic compound (A) if inhaled causes the loss of consciousness and if heated with conc. HNO<sub>3</sub> forms a component of tear gas.

i) How would you prepare compound (A) by using one of the isomers of C<sub>4</sub>H<sub>8</sub>O? [2]

ii) What happens when compound (A) is : (a) exposed in air (b) heated with Ag powder (c) condensed with acetone, and (d) heated with aniline in the presence of alc. KOH? [4]

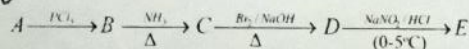
b) Give reasons :

i) Ether is stored in the bottle containing iron wire. [2]

ii) Though ethanol is an organic compound, it is soluble in water.

Or

A sequence of reaction in general form is expressed as:



Compound A is a carboxylic acid that produces ethanoic anhydride on being heated with P<sub>2</sub>O<sub>5</sub>.

a) Identify A, B, C, D and E with reactions involved. [5]

b) If the compound A undergoes Hell-Volhard-Zelinsky reaction, write the reactions leading to the final product. [1]

c) What product will be formed if compound B is treated with ethanol? [1]

Contd.

3021'R'

(4)

d) How would you convert compound 'E' into methanal? [1]

22. a) What is Portland cement? List out the major constituents of Portland cement. [2]

b) Give the structural formula of monomer and a use of each of the following:

i) Nylon 6,6      ii) Polystyrene [2]

c) Differentiate between:

i) Nuclear reactions and chemical reactions. [2]

ii) Fibrous and non-fibrous raw materials for the paper production [2]

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