

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

Rewrite the correct options of each questions in your answer sheet.

- Alcohol vapour can be dehydrated by passing over.
A) Conc. H_2SO_4 B) heated Al_2O_3
C) heated Cu D) anhydrous $CaCl_2$
- Ⓐ $\xrightarrow{aq. NaOH}$ Ⓑ $\xrightarrow{K_2Cr_2O_7 / H^+}$ Ⓒ. The compound Ⓒ undergoes Clemenson's reduction to give propane. The compound Ⓐ is
A) Propan-1-ol B) Propan-2-ol
C) 2-halopropane D) Propanoic acid
- Phenol on treatment with conc. HNO_3 in the presence of Conc. H_2SO_4 gives
A) m-nitrophenol B) O-nitrophenol
C) p-nitrophenol D) Picric acid
- Acetaldehyde and acetophenone can be separated from their mixture by using the reagent.
A) $NaOH + I_2$ B) 2, 4- DNPH C) $NaHSO_3$ D) NH_2-NH_2
- The order of basic strength of 1° amine, 2° amine, 3° amine and ammonia is
A) $3^\circ > 2^\circ > 1^\circ > NH_3$ B) $2^\circ > 1^\circ > 3^\circ > NH_3$
C) $2^\circ > 3^\circ > 1^\circ > NH_3$ D) $3^\circ > 1^\circ > 2^\circ > NH_3$
- Which element is added with copper to form bronze ?
A) Fe B) Mn C) Sn D) Zn
- During the extraction of iron from hematite the limestone acts as;
A) Reducing agent B) Gangue

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- Which one is the strongest **Bronsted** base in the following ions ?
A) ClO^- B) ClO_2^- C) ClO_3^- D) ClO_4^-
 - The unit of rate constant is (k) $mol\ Lit^{-1}\ sec^{-1}$, the reaction is.
A) Zero order B) first order
C) Pseudo first order D) 2nd order
 - The heat of reaction in the following chemical reaction $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ is termed as
A) enthalpy of formation
B) enthalpy reaction
C) enthalpy of combustion
D) enthalpy of solution
 - How much water should be evaporated from 400 ml of $\frac{N}{10}$ HCl to make it exactly 2N.
A) 360 ml B) 370ml C) 380ml D) 390ml
- Group 'B'** 8×5=40
- Acidic strength of solution can be measured in term of P^H value.
i) Define P^H of a solution
ii) What is the application of P^H in our daily life ?
iii) If equal volume of two solutions having ($P^H = 1$) and ($P^H = 12$) are mixed together, what will be the P^H of the solution ? (1+1+3)
- Or
- State and explain the Hess's law of constant heat summation. (5)
- Standard hydrogen electrode can be used as reference electrode. The standard electrode potential of standard hydrogen electrode is taken as zero.
i) Define standard hydrogen electrode
ii) What is the major application of standard hydrogen electrode ?
iii) Draw well labeled diagram of standard hydrogen electrode.
iv) What is meant by standard electrode potential ? (1+1+2+1)
 - Grignard reagent is an organometallic compound which is used to synthesize various organic compound. Starting from CH_3MgBr , how would you prepare
i) methane ii) ethanoic acid
iii) ethanol iv) propan-2-ol
v) 2-methyl propan-2-ol

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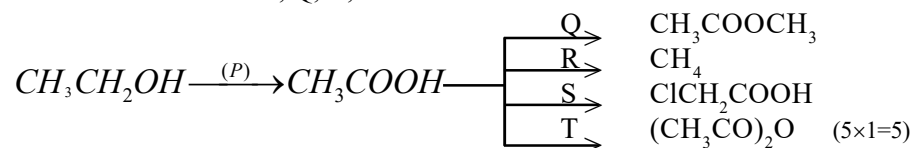
(3)

3021'D'

Or

An organic compound (A) when heated with Ag powder gives C_2H_2 and form carbonyl chloride when it exposes to air.

- Identify the compound (A)
 - Write reaction for the laboratory method of preparation of (A)
 - What happens when the compound (A) is treated with conc. nitric acid.
 - convert (A) into methanoic acid (1+2+1+1)
15. Give principle and procedure for the separation of 1°, 2° and 3° amines by Hoffmann's method. (5)
16. A carbonyl compound (X) gives iodoform test and can be obtained by oxidation of a monohydric alcohol containing three carbon atoms.
- Write down the structural formula of (X).
 - Give functional isomer of (X) giving IUPAC name.
 - How is (X) prepared from 2,2-dichloropropane.
 - Write reactions for the conversion of (X) into 2-hydroxy-2-methyl propanoic acid.
 - What is the laboratory test of carbonyl compound? (5×1=5)
17. Complete the following reaction sequences using suitable reagents and conditions in P, Q, R, S and T



18. Penta-hydrated copper sulphate is called blue vitriol.
- Starting from metallic, copper, how can you obtain blue vitriol?
 - What happens when aq. solution of blue vitriol is treated with excess ammonia solution?
 - Give chemical reaction of conversion of blue vitriol into black oxide.
 - Why is hydrated copper sulphate called blue vitriol? (1+1+2+1)
19. A metal (M) is extracted from its sulphide ore whose atomic number is 80. It also occurs as the amalgams of certain metals and is popularly known as quick silver. (5×1=5)
- Name the metal 'M' and write down the molecular formula of its common ore.
 - Why is this metal called quick silver.
 - State the process by which the ore is concentrated during its extraction.
 - Write down the chemical reaction involved during reduction in its extraction.

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(4)

- v) Mention a major use of the metal.

Group 'C'

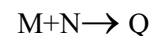
3×8=24

20. a) Nitrobenzene is an industrial chemical and yellow oily liquid with almond like odour.
- Write down the chemical reaction for the nitration of benzene to prepare nitrobenzene.
 - Why is nitro group in nitrobenzene meta-directing in nature?
 - What happens when nitrobenzene is reduced with electrolytic medium.
 - Give a structural formula of an aromatic polynitro compound which is used as explosives. (1+2+1+1)
- b) Consider the following reaction sequence.
- $$C_6H_5CH_3 \xrightarrow{(x)} C_6H_5CHO \xrightarrow{alc. KCN} B$$
- Write down reagent and condition in place of (x).
 - Identify the compound (B)
 - What product is obtained when C_6H_5CHO is subjected to Clemenson's reduction? (1+1+1)

Or

Given an example of each of the following reactions.

- Cannizzaro's reaction
 - Coupling reaction
 - Rosemund's reduction
 - Hydroboration-oxidation
 - Williamson's etherification
 - Sandmeyer's reaction.
 - Carbonylation reaction
 - Perkin's reaction (8×1=8)
21. (a) Order of reaction can experimentally be determined by comparing the rate of reaction with change in concentration of particular reactant.
- Define order of reaction.
 - Write down the unit of rate constant of zero order reaction.
 - Give any two point of differences between order and molecularity of reaction. (1+1+2)
- b) For the following hypothetical reaction.



When the concentration M is doubled, rate becomes doubled. If the

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(5)

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concentration of both M and N are doubled, rate becomes 16 times.

- i) Write down rate law equations
- ii) Find out the overall order of reaction (2+2)

Or

- a) During titration, the concentration of KMnO_4 solution can be determined by using standard oxalic acid solution. (1+1+1+1)

- i) What is meant by standard solution ?
- ii) Calculate the equivalent weight of KMnO_4 in acidic medium.
(Molar mass of $\text{KMnO}_4 = 158$)

iii) Why is above titration called redox titration ?

iv) Name the indicator used in this titration.

- b) 1 gm of a divalent metal was dissolved in 25ml of $1\text{M H}_2\text{SO}_4$. The unreacted acid further required 15 C.C. of NaOH ($f=0.8$) for complete neutralization. (1+3)

i) Calculate the gram equivalent of unreacted acid

ii) Find the atomic weight of metal.

22. a) What is meant by artificial radioactivity ? Write an example of it. (1+1)

b) PVC and nylon-66 are two common polymers widely used in daily life.

- i) State the process of polymerization by which nylon-66 is formed.
- ii) Write down the chemical reaction to form PVC. (1+1)

c) i) What is Portland cement ? Name the major compositions of Portland cement. (1+2)

ii) Define the term clinker (1)

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