Indian School Al Wadi Al Kabir

Assessment – I (2025-2026)

Class: XII | Subject: CHEMISTRY (043) | Max. marks: 70

Date: 21/09/2025 | Set - I | Time: 3 Hours

General Instructions:

Read the following instructions carefully.

(a) There are 33 questions in this question paper with internal choice.

(b) SECTION A consists of 16 multiple-choice questions carrying 1 mark each.

(c) SECTION B consists of 5 short-answer questions carrying 2 marks each.

(d) SECTION C consists of 7 short-answer questions carrying 3 marks each.

(e) SECTION D consists of 2 case-based questions carrying 4 marks each.

(f) SECTION E consists of 3 long answer questions carrying 5 marks each.

(g) All questions are compulsory.

(h) Use of log tables and calculators is not allowed.

SECTION A

Question 1 to 16 are multiple-choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. Which of the following is a disaccharide?

(A) Maltose (B) Glucose

(C) Starch (D) Fructose

2. Which of the following compounds is least reactive towards nucleophilic addition?

(A) Ethanal (B) Propanal

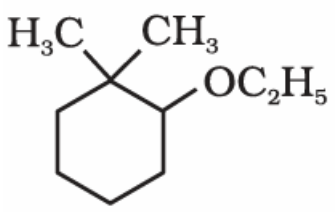
(C) Propanone (D) Benzaldehyde

3. Nucleophilic addition of Grignard reagent to ketones followed by hydrolysis with dilute acids forms:

(A) Primary alcohol (B) Secondary alcohol

(C) Tertiary alcohol (D) Aldehyde

4. Write the IUPAC name of the following compound.



(A) 1-Ethoxy-2,2-dimethylcyclohexane (B) 2-Ethoxytoluene

(C) 2-Ethoxy-1,1-dimethylcyclohexane (D) 2,2-Dimethyl-1-ethoxycyclohexane

5. Which of the following terms is correct about enzymes?

(A) Hormones (B) Carbohydrates

(C) Nucleic acids (D) Proteins

6. Which of the following compounds does not undergo aldol condensation?

(A) Methanal (B) Ethanal

(C) Propanal (D) Propanone

7. The Gabriel phthalimide synthesis is used for the preparation of:

(A) Primary aromatic amines (B) Primary aliphatic amines

(C) Secondary amine (D) Tertiary amines

8. The action of HNO_2 on ethylamine gives mainly:

(A) Ethyl nitrite (B) Nitroethane

(C) Ethane (D) Ethanol

9. Which one of the following halides contains $C_{sp^2} - X$ bond?

(A) Alkyl halide (B) Vinyl halide

(C) Allyl halide (D) Benzyl halide

10. Which of the following haloalkanes reacts with aqueous KOH most rapidly by S_N1 reaction?

(A) 1-Bromobutane (B) 2-Chlorobutane

(C) 2,2-Dimethyl-1-chloropropane (D) 2-Bromo-2-methylpropane

11. When alkyl iodide is treated with a large excess of ammonia, the major product obtained is:

(A) Primary amine (B) Secondary amine

(C) Tertiary amine (D) Quaternary ammonium salt

12. Arrange the following compounds in increasing order of their boiling points.

CH_3CHO, CH_3CH_2OH, CH_3OCH_3, CH_3COOH

(A) $CH_3COOH < CH_3CH_2OH < CH_3CHO < CH_3OCH_3$

(B) $CH_3CHO < CH_3OCH_3 < CH_3CH_2OH < CH_3COOH$

(C) $CH_3OCH_3 < CH_3CHO < CH_3CH_2OH < CH_3COOH$

(D) $CH_3CH_2OH < CH_3CHO < CH_3OCH_3 < CH_3COOH$

13. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): Albumin is a globular protein.

Reason (R): The polypeptide chain in albumin coils around to give a straight chain.

Select the most appropriate answer from the options given below:

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

14. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): The pKa of ethanoic acid is lower than that of $ClCH_2COOH$

Reason (R): Chlorine shows electron withdrawing effect, which increases the acidic character of $ClCH_2COOH$

Select the most appropriate answer from the options given below:

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

15. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): All aliphatic amines form a foul-smelling compound when heated with $CHCl_3$ and alcoholic KOH.

Reason (R): Carbylamines are foul-smelling compounds.

Select the most appropriate answer from the options given below:

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

16. Given below are two statements labelled as Assertion (A) and Reason (R)

Assertion (A): Phenol is strongly acidic as compared to ethanol.

Reason (R): Phenoxide ion is more stable than ethoxide ion.

Select the most appropriate answer from the options given below:

(A) Both A and R are true and R is the correct explanation of A

(B) Both A and R are true but R is not the correct explanation of A.

(C) A is true but R is false.

(D) A is false but R is true.

SECTION B

Question No. 17 to 21 are very short answer questions carrying 2 marks each.

17. Attempt either option A or B

A. Answer the following:

How can you convert?

(i) Benzoic acid to aniline

(ii) Aniline to p-bromoaniline

OR

B. Answer the following:

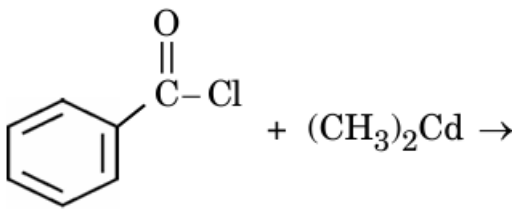
a) Why does aniline not give Friedel-Crafts reaction?

b) Arrange the following in the increasing order of their pK_b values in the gas phase:

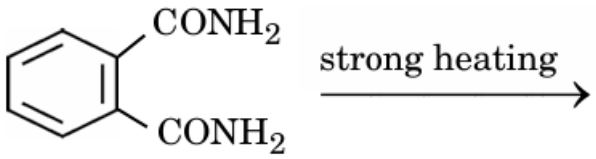
$C_6H_5NH_2$, NH_3, CH_3NH_2, $(CH_3)_3N$

18. Write the product(s) in the following reactions:

a)



b)



19. Write the mechanism for the dehydration of ethanol with conc. H_2SO_4 at 413 K to give Ethoxyethane.

20. a) Sucrose is dextrorotatory but the mixture obtained after hydrolysis is laevorotatory. Why?

b) Give two examples of water-soluble vitamins.

21. Write the equations for the preparation of 1-Iodobutane from:

a) 1-Chlorobutane

b) But-1-ene.

SECTION C

Question No. 22 to 28 are short answer questions, carrying 3 marks each.

22. Carry out the following conversions. (Attempt any 3)

a) Toluene to Benzoic acid
b) Benzoyl chloride to Benzaldehyde
c) Ethanol to 3-hydroxybutanal
d) Bromobenzene to Benzoic acid

23. An organic compound (X) having molecular formula $C_5H_{10}O$ can show various properties depending on its structures. Draw each of the structures if it:

a) shows Cannizzaro reaction.
b) reduces Tollens' reagent and has a chiral carbon.
c) gives positive iodoform test.

24. An organic compound (A) having molecular formula C_6H_6O gives a characteristic colour with aq. $FeCl_3$ solution. When (A) is treated with CO_2 and NaOH at 400 K under pressure, (B) is obtained. The compound (B) on acidification gives compound (C) which reacts with acetyl chloride to form (D) which is a popular pain killer. Write the structures of A, B, C and D.

25. a) What is the difference between Nucleoside and Nucleotide?
b) Name the 4 bases present in DNA.
c) What are the 3 types of RNA

26. Arrange the following:

a) i) p-nitroaniline, p-toluidine, Aniline (in increasing order of basic strength)

ii) $(C_2H_5)_2NH$, $C_2H_5NH_2$, $C_6H_5NH_2$ (in increasing order of solubility in water)

b) Why can aniline not be prepared by the ammonolysis of chlorobenzene under normal conditions?

27. a) Carbohydrates are classified on the basis of their behaviour on hydrolysis. Write the hydrolysis products of lactose.
b) Write two differences between Amylose and Amylopectin.

28. What happens when:

a) Bromobenzene is treated with Mg in the presence of dry ether?
b) Benzyl chloride is treated with aqueous KOH?
c) 2,4,6-trinitrochlorobenzene is treated with warm water?

SECTION D

Question No. 29 & 30 are case-based/data -based questions carrying 4 marks each.

29. Alcohols undergo a number of reactions involving the cleavage of C – OH bond. However, phenols do not undergo reactions involving the cleavage of C – OH bond. Alcohols are weaker acids than water. Alcohols react with halogen acids to form the corresponding haloalkanes. Phenols are stronger acids than alcohols. A characteristic feature of phenols is that they undergo electrophilic substitution reactions such as halogenation, nitration, etc. Since – OH group is a strong activating group, phenol gives trisubstituted products during halogenation, nitration, etc.

a) Write equations for the reaction of phenol with the following?
i) Br_2 water ii) Conc. HNO_3

b) The ortho and para isomers of Nitrophenol can be separated by steam distillation. Give reason.

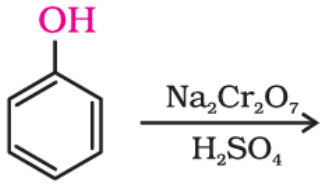
c) Which of the following reactions is used to convert Phenol to Salicylic acid?

(A) Reimer-Tiemann reaction (B) Kolbe's reaction

(C) Swarts reaction (D) Finkelstein reaction

OR

c) Identify the product of the following reaction:

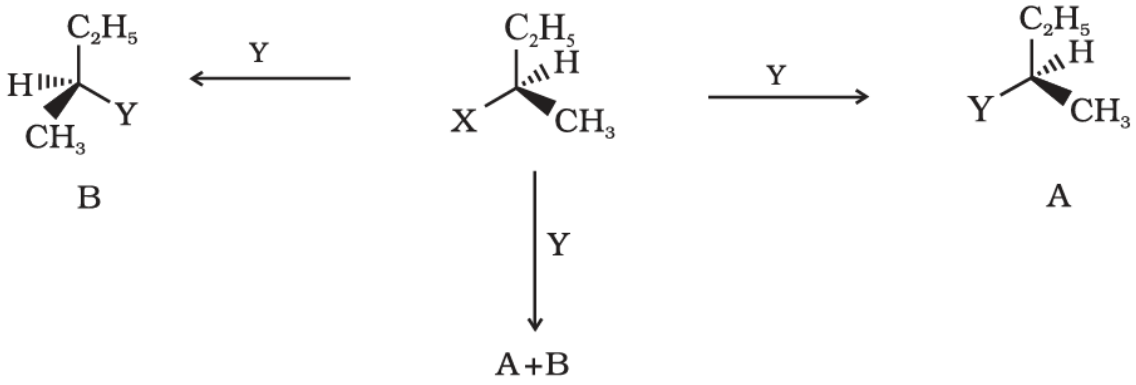


(A) Benzoic acid (B) Benzoquinone

(C) Benzene (D) Benzamide

30. The observation of Louis Pasteur (1848) that crystals of certain compounds exist in the form of mirror images laid the foundation of modern stereochemistry. He demonstrated that aqueous solutions of both types of crystals showed optical rotation, equal in magnitude (for solution of equal concentration) but opposite in direction. The symmetry and asymmetry are also observed in many day-to-day objects: a sphere, a cube, a cone, are all identical to their mirror images and can be superimposed. However, many objects are non-superimposable on their mirror images.

a) Consider the replacement of a group X by Y in the following reaction.



i) Name the process if (A) is the only product formed.
ii) Name the process if (B) is the only product formed.

b) What is a racemic mixture?

c) Which of the following compounds would undergo dehydrohalogenation faster?

1-Bromobutane or 2-Bromo-2-methylpropane

SECTION E

Question No. 31 to 33 are long answer type questions carrying 5 marks each.

31. Attempt either A or B

A. Answer the following questions:

a) Why are amino acids amphoteric?

b) What are essential amino acids?

c) Differentiate between acidic and basic amino acids.

d) Name the linkage formed when carboxyl end of one amino acid condenses with amino end of other amino acid.

e) Name the only naturally occurring α-amino acid which is optically inactive.

OR

B. Answer the following questions:

a) Write chemical equation for the reaction of D-glucose with the following reagents:

i) HCN ii) Br_2 water iii) HI

b) Draw the pyranose structure of α–Glucose.

32. Attempt either A or B

A. Answer the following questions:

a) Give chemical tests to distinguish between the following pairs of compounds:

i) Pentan-2-one and Pentan-3-one

ii) Benzaldehyde and Methanal

iii) Benzoic acid and Ethyl benzoate

b) Write the reaction involved in the following:

i) Clemmensen reduction

ii) Hell-Volhard-Zelinsky reaction

OR

B. Answer the following questions:

a) An organic compound (A) with the molecular formula $C_9H_{10}O$ forms 2,4-DNP derivative, reduces Tollens' reagent but does not react with Fehling solution. It undergoes Cannizzaro reaction but does not form iodoform. On vigorous oxidation, it gives Benzene-1,2-dicarboxylic acid.

i) Identify the compound (A) and write its IUPAC name.

ii) Write the equation of compound (A) when it undergoes Cannizzaro reaction.

b) Arrange the following in the decreasing order of their acidic strength:

CH_3COOH, O_2NCH_2COOH, $ClCH_2COOH$

c) Name the reagent in the following reaction:

$$CH_3 - CH = CH - CH_2 - CN \xrightarrow{?} CH_3 - CH = CH - CH_2 - CHO$$

33. Attempt either A or B

A. Answer the following questions:

a) Identify A, B and C in the following reactions:

i) $C_6H_5CH_2Cl \xrightarrow{AgNO_2} A \xrightarrow{Sn/HCl} B \xrightarrow[Alc.\,KOH]{CHCl_3} C$

ii) $CH_3NH_2 \xrightarrow{HNO_2} A \xrightarrow{PCl_5} B \xrightarrow{KCN} C$

b) Describe a method for the identification of CH_3NH_2, $(CH_3)_2NH$ and $(CH_3)_3N$

OR

B. Answer the following questions:

a) Although $-NH_2$ group is *o/p* directing in electrophilic substitution reactions, yet aniline, on nitration gives good yield of m-nitroaniline. Why?

b) Write the chemical reaction of methyl amine with benzoyl chloride and write the IUPAC name of the product obtained.

c) Write the structures of A and B in the following reactions:

(i) $C_6H_5N_2^+Cl^- \xrightarrow{CuCN} A \xrightarrow{H_2O/H^+} B$

(ii) $CH_3COOH \xrightarrow[\Delta]{NH_3} A \xrightarrow{NaOBr} B$