CHEMISTRY (CODE – 043)

Chapter-wise Test: Amines

(NCERT Class XII Chemistry, Unit 9: Amines)

PRACTICE QUESTION PAPER

CLASS XII (2026-27)

Time: 1½ hours **Max. Marks: 35**

GENERAL INSTRUCTIONS: Read the following instructions carefully.

1. There are 17 questions in this question paper with internal choice. All questions are based on Unit 9: Amines.
2. SECTION A consists of 8 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 3 very short answer questions carrying 2 marks each.
4. SECTION C consists of 4 short answer questions carrying 3 marks each.
5. SECTION D consists of 1 case-based question carrying 4 marks.
6. SECTION E consists of 1 long answer question carrying 5 marks.
7. All questions are compulsory. Internal choice is provided in Questions 9 to 15, 16(iii) and 17.
8. Questions 2, 3, 9, 12, 13, 14 and 16 are based on figures, structures or data tables given in the paper.
9. Use of log tables and calculators is not allowed.

SECTION A

Questions 1 to 8 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. Each question carries 1 mark.

1 The IUPAC name of the amine CH_3CH_2–N(CH_3)–CH_2CH_3 is: 1

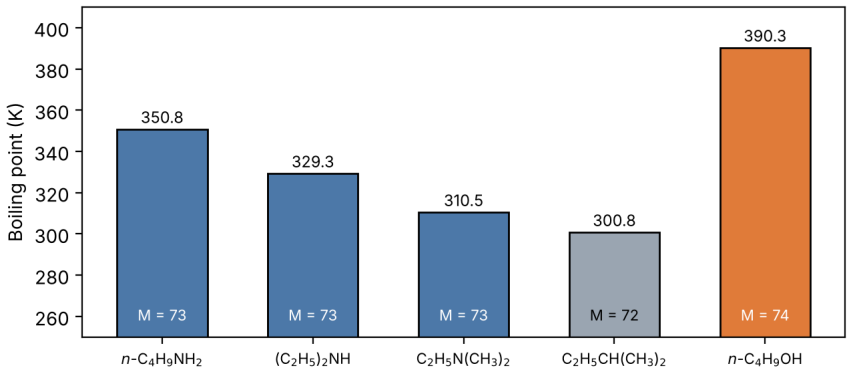
A. N,N-Dimethylbutan-1-amine
B. N-Methyl-N-ethylpropan-1-amine
C. Triethylamine
D. N-Ethyl-N-methylethanamine

2 The table lists some reactions of nitrogen compounds with the main organic product. 1

Row	Reactant	Reagent	Main product
1	Aniline	$NaNO_2$ + HCl, 273–278 K	Phenol
2	Nitrobenzene	Fe + HCl	Aniline
3	Benzamide	Br_2 + NaOH	Aniline
4	Aniline	$CHCl_3$ + alc. KOH, heat	Phenyl isocyanide

Which row of the table is **incorrect**?

A. Row 1
B. Row 2
C. Row 3
D. Row 4

3	Fig. 1 shows the boiling points of some compounds of nearly the same molar mass (M).  **Fig. 1** The boiling point decreases from *n*-$C_4H_9NH_2$ to $C_2H_5N(CH_3)_2$ mainly because: A. the molar mass decreases B. the dipole moment increases C. the number of N–H bonds available for intermolecular hydrogen bonding decreases D. the basicity increases	1
4	Which of the following amines **cannot** be prepared by the Gabriel phthalimide synthesis? A. Methanamine B. Benzenamine (aniline) C. Phenylmethanamine D. Butan-1-amine	1
5	Propanamide, $CH_3CH_2CONH_2$, is warmed with Br_2 and aqueous NaOH. The main organic product is: A. propan-1-amine B. methanamine C. N-methylethanamine D. ethanamine	1
6	Which of the following compounds will give a foul-smelling isocyanide when warmed with chloroform and alcoholic KOH? A. $C_6H_5CH_2NH_2$ B. $C_6H_5NHCH_3$ C. $C_6H_5N(CH_3)_2$ D. $(C_2H_5)_3N$	1
7	Aniline is treated with excess of bromine water at room temperature. The product is: A. *p*-bromoaniline B. 2,4,6-tribromoaniline C. *m*-bromoaniline D. no reaction occurs	1
8	Given below are two statements labelled Assertion (A) and Reason (R). **Assertion (A):** Aniline does not undergo the Friedel–Crafts reaction. **Reason (R):** The $-NH_2$ group of aniline is a strongly electron-withdrawing group by resonance and activates the ring towards the electrophile. Select the correct answer from the options 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.	1

SECTION B

Question Nos. 9 to 11 are very short answer questions carrying 2 marks each.

9 **Attempt either A or B.** 2

(A) The table gives the pK_b values of some bases in aqueous solution.

Base	pK_b
Methanamine, CH_3NH_2	3.38
N-Methylmethanamine, $(CH_3)_2NH$	3.27
N,N-Dimethylmethanamine, $(CH_3)_3N$	4.22
Ammonia, NH_3	4.75
Benzenamine, $C_6H_5NH_2$	9.38

(i) Arrange the five bases in decreasing order of basic strength.
(ii) Why is aniline a much weaker base than methanamine?

OR

(B) (i) Arrange $(C_2H_5)_2NH$, $C_2H_5NH_2$, NH_3 and $C_6H_5NH_2$ in decreasing order of basic strength in aqueous solution.
(ii) Name the main factor (other than steric hindrance) that makes trimethylamine a weaker base than dimethylamine in water, although the gas-phase order is 3° > 2° > 1°.

10 **Attempt either A or B.** 2

(A) (i) Write the chemical equation for the conversion of benzamide into aniline using Br_2 and NaOH.
(ii) How many carbon atoms does the amine have compared with the amide used?

OR

(B) (i) Write the steps (with reagents) of the Gabriel phthalimide synthesis of ethanamine from phthalimide.
(ii) Why is this method not used to prepare secondary or tertiary amines?

11 **Attempt either A or B.** 2

(A) Give one chemical test each to distinguish between: (i) methanamine and N,N-dimethylmethanamine; (ii) aniline and N-methylaniline.

OR

(B) Account for the following: (i) Aniline does not undergo Friedel–Crafts reaction. (ii) Ethanamine is soluble in water whereas aniline is insoluble in water.

SECTION C

Question Nos. 12 to 15 are short answer questions carrying 3 marks each.

12 **Attempt either A or B.** 3

(A) Three isomeric amines X, Y and Z have the molecular formula C_3H_9N. Their reactions with benzenesulphonyl chloride (Hinsberg reagent) followed by aqueous KOH are recorded below.

Amine	With $C_6H_5SO_2Cl$ / aq. KOH	Carbylamine test
X	Clear solution (soluble in alkali)	Positive
Y	Insoluble solid remains	Negative
Z	No reaction	Negative

(i) Identify the class (1°, 2° or 3°) of X, Y and Z.
(ii) Why is the sulphonamide from X soluble in alkali?
(iii) Give the IUPAC name of Z.

OR

(B) Convert aniline into *p*-bromoaniline. Write the three steps and give the reason for the first step.

13 **Attempt either A or B.** 3

(A) Study the reaction scheme in Fig. 2 and answer the questions.

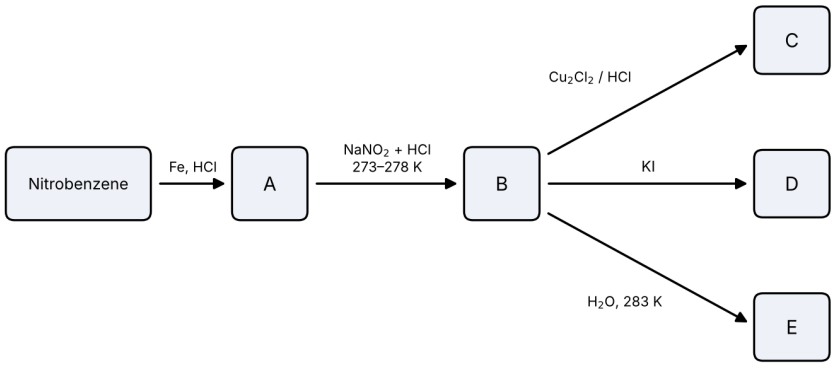
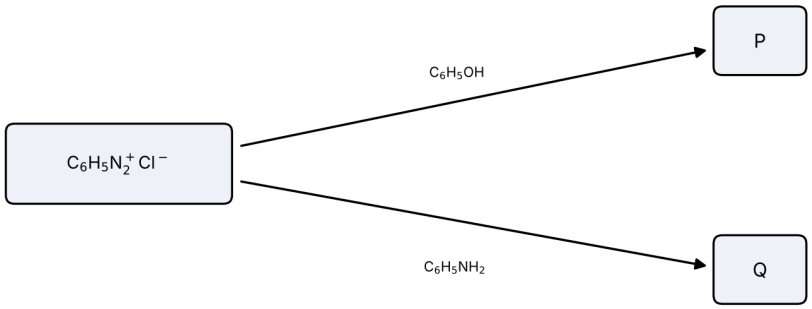


Fig. 2

(i) Write the names of A and B.
(ii) Identify C and D, and name the reaction that gives C.
(iii) What is E?

OR

(B) Give the chemical equation for the conversion of benzenediazonium chloride into (i) fluorobenzene and (ii) benzene. Name the reagent used in each case.

14	**Attempt either A or B.** **(A)** Benzenediazonium chloride reacts with phenol and with aniline as shown in Fig. 3.  **Fig. 3** (i) Name the type of reaction shown. (ii) Write the names of P and Q. (iii) Why are compounds such as P and Q coloured? **OR** **(B)** Explain why (i) the pK_b of aniline is more than that of methanamine, (ii) methylamine in water reacts with ferric chloride to precipitate hydrated ferric oxide, (iii) arenediazonium salts are more stable than alkyldiazonium salts.	3
15	**Attempt either A or B.** **(A)** (i) Write the equation for the reaction of aniline with ethanoyl chloride in the presence of pyridine. (ii) Why is pyridine used? (iii) Why is aniline acetylated before it is nitrated? **OR** **(B)** Write the products and state the conditions or reagents in each case: (i) aniline with concentrated H_2SO_4, followed by heating at 453–473 K; (ii) aniline with excess of CH_3I in the presence of Na_2CO_3; (iii) ethylamine with HNO_2 ($NaNO_2$ + HCl).	3

SECTION D

Question No. 16 is a case-based/data-based question carrying 4 marks.

16 **Read the passage and answer the questions that follow.** 4

The basic character of amines is due to the lone pair of electrons on nitrogen. The basic strength in aqueous solution depends on the +I effect of the alkyl groups, solvation of the ammonium ion by hydrogen bonding, and steric hindrance. Aryl groups decrease basic strength because of resonance. The table gives pK_b values in aqueous solution.

Amine	pK_b	Amine	pK_b
CH_3NH_2	3.38	$C_6H_5NH_2$	9.38
$(CH_3)_2NH$	3.27	$C_6H_5NHCH_3$	9.30
$(CH_3)_3N$	4.22	$C_6H_5CH_2NH_2$	4.70
NH_3	4.75	$C_6H_5N(CH_3)_2$	8.92

(i) Which is the strongest base in the table? Is it a primary, secondary or tertiary amine?
(ii) Why is $C_6H_5CH_2NH_2$ (pK_b 4.70) a much stronger base than $C_6H_5NH_2$ (pK_b 9.38)?
(iii) State the order of basic strength of the three methylamines and ammonia in the gas phase, and explain why the order in water is different.

OR

(iii) Which is the stronger base, *p*-nitroaniline or *p*-methylaniline? Give a reason.
(iv) Which has the larger K_b, aniline or N-methylaniline? Give a reason.

SECTION E

Question No. 17 is a long answer question carrying 5 marks.

17 **Attempt either A or B.** 5

(A) An organic compound A has the molecular formula $C_7H_6O_2$. It reacts with ammonia to form a salt that on heating gives B, C_7H_7NO. On treatment with Br_2 and aqueous NaOH, B gives a primary amine C, C_6H_7N. C reacts with $NaNO_2$ and HCl at 273–278 K to give D, and D reacts with phenol to give a coloured compound E.
(i) Write the structures and IUPAC names of A, B and C.
(ii) Write the equation for the formation of C from B.
(iii) Identify D and E.
(iv) Name one chemical test that confirms C is a primary amine, and write its equation.

OR

(B) Write the reagents and equations for the following conversions:
(i) Bromoethane into propan-1-amine
(ii) Aniline into 1,3,5-tribromobenzene

— End of Question Paper —