FREE EDITION · NOTES + 3 SAMPLE MCQS

CUET · CHEMISTRY · CLASS XII · CODE 306

Amines

CUET unit: Amines

By **UniDrill** · NCERT-grounded study material

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📌 Snapshot

- Amines are derivatives of ammonia obtained by replacing one, two or three H atoms by alkyl/aryl groups; nitrogen is sp^3 hybridised, giving a pyramidal geometry.
- Covers classification (1°, 2°, 3°), nomenclature (common + IUPAC), six preparation routes, basicity in gas vs aqueous phase, distinguishing tests (carbylamine, Hinsberg, HNO_2), and electrophilic substitution of arylamines.
- Diazonium salts derived from aniline are introduced as versatile synthetic intermediates allowing replacement of $–N_2^+$ by –Cl, –Br, –I, –F, –CN, –OH, $–NO_2$, –H, and azo-coupling to give dyes.
- CUET regularly tests product prediction (Hofmann bromamide, Sandmeyer, Gabriel), basicity ordering with pKb logic, and identification of amines using the Hinsberg/carbylamine tests.

📖 Detailed Notes

2.1 Core concepts

- Amines are formed by replacing one, two or three H atoms of NH_3 with alkyl/aryl groups; biologically they occur in proteins, vitamins, alkaloids and hormones; commercially used in medicines, dyes and polymers (NCERT Introduction, p. 259).
- Nitrogen in amines is sp^3 hybridised with one unshared lone pair; geometry is pyramidal and the C–N–E angle is less than 109.5° (108° in trimethylamine, Fig. 9.1) (NCERT §9.1, p. 259-260). The lone pair occupies the fourth sp^3 orbital and is responsible for both the basicity and nucleophilicity of amines.
- Classification: 1° ($R–NH_2$), 2° (R–NHR′), 3° (R_3N) depending on number of H atoms of NH_3 replaced; "simple" if all alkyl/aryl groups are identical, "mixed" if different (NCERT §9.2, p. 260). Aromatic amines may carry $–NH_2$ on the ring (aniline) or on a side chain (benzylamine, $C_6H_5CH_2NH_2$ — still aliphatic in nature).
- Nomenclature: common system uses alkylamine (one word); IUPAC names primary amines as alkanamines (replace "e" of alkane by "amine"); secondary/tertiary use locant N (e.g., $CH_3NHCH_2CH_3$ = N-methylethanamine); $C_6H_5NH_2$ = aniline = benzenamine (NCERT §9.3, Table 9.1, p. 260-261).
- Preparation routes: (1) Reduction of nitro compounds with H_2/Ni, Pd or Pt or with Fe/HCl ($FeCl_2$ hydrolyses to regenerate HCl, so only catalytic HCl needed); active

metals + acidic medium (Sn/HCl, Fe/HCl) reduce $ArNO_2$ → $ArNH_2$; selective reduction with H_2S, polysulphide or Fe/HCl leaves another reducible group untouched (NCERT §9.4(1), p. 262).

- (2) Ammonolysis of alkyl halides with ethanolic NH_3 in a sealed tube at 373 K — gives a mixture of 1°, 2°, 3° amines and quaternary ammonium salt (Hofmann's exhaustive alkylation); reactivity RI > RBr > RCl; large excess NH_3 favours primary amine while excess alkyl halide favours quaternary salt (NCERT §9.4(2), p. 262-263).
- (3) Reduction of nitriles with $LiAlH_4$ or catalytic H_2/Ni, Pd, Pt gives 1° amines with one more carbon — used for "ascent of amine series" (Mendius reduction); (4) Reduction of amides with $LiAlH_4$ gives amines (NCERT §9.4(3-4), p. 263).
- (5) Gabriel phthalimide synthesis: phthalimide + ethanolic KOH → potassium phthalimide → alkyl halide (SN2) → alkaline hydrolysis (or hydrazinolysis) → primary amine + phthalhydrazide; works ONLY for aliphatic 1° amines, since aryl halides do not undergo nucleophilic substitution with the phthalimide anion (NCERT §9.4(5), p. 264).
- (6) Hofmann bromamide degradation: $R/Ar{-}CONH_2 + Br_2 + 4\ NaOH \rightarrow R/Ar{-}NH_2 + Na_2CO_3 + 2\ NaBr + 2\ H_2O$ — gives a primary amine with one carbon less than the amide; involves migration of the alkyl/aryl group from carbonyl C to N through an isocyanate intermediate (NCERT §9.4(6), p. 264). Benzamide → aniline; acetamide → methanamine.
- Physical properties: lower aliphatic amines are gases with fishy odour; higher ones smell like fish; aniline and arylamines are colourless but darken on storage due to atmospheric oxidation; lower amines are water-soluble via N–H···O hydrogen bonding, solubility falls with increasing alkyl mass; alcohols are more polar than amines (O is more electronegative than N) and form stronger H-bonds (NCERT §9.5, p. 265).
- Boiling point order of isomeric amines: 1° > 2° > 3° because 1° has two N–H bonds available for intermolecular H-bonding while 3° has none; Table 9.2 shows n-$C_4H_9NH_2$ (350.8 K) > $(C_2H_5)_2NH$ (329.3 K) > $C_2H_5N(CH_3)_2$ (310.5 K) > $(C_2H_5)(CH_3)_2N$ (310 K) and n-C_4H_9OH (390.3 K) > n-$C_4H_9NH_2$ (NCERT §9.5, Table 9.2, p. 266).
- Basicity: amines react with acids to form salts; aliphatic amines are stronger bases than NH_3 (+I effect of alkyl groups, pK_b 3–4.22); aromatic amines are weaker than NH_3 (lone pair in conjugation with ring; aniline $pK_b = 9.38$) (NCERT §9.6, Table 9.3, p. 266-267). Smaller pK_b means stronger base; $K_b = [R\text{-}NH_3^+][OH^-]/[R\text{-}NH_2]$.
- Gas-phase basicity order: 3° > 2° > 1° > NH_3 (governed only by the +I effect of alkyl groups); aqueous-phase order is irregular due to interplay of (a) +I electron release, (b) solvation/H-bonding stabilisation of the alkyl-substituted ammonium cation, and (c) steric hindrance to solvation. NCERT gives the ethyl series as $(C_2H_5)_2NH$ > $(C_2H_5)_3N$ > $C_2H_5NH_2$ > NH_3 and the methyl series as $(CH_3)_2NH$ > CH_3NH_2 > $(CH_3)_3N$ > NH_3 (NCERT §9.6.1, p. 268-269).
- Aniline is less basic than NH_3 because aniline has five resonance structures (lone pair delocalised into the benzene ring) but anilinium ion has only two — so the free amine

is more stabilised than its conjugate acid; electron-releasing groups (–OCH_3, –CH_3) at p-position increase basicity, while electron-withdrawing groups (–NO_2, –SO_3H, –COOH, –X) decrease it. Order: p-toluidine > aniline > p-nitroaniline (NCERT §9.6.1(b), p. 269).

- Alkylation: amines react with alkyl halides giving 2°, 3° amines and quaternary salts (Hofmann's exhaustive alkylation); acylation: 1° and 2° amines react with acid chlorides, anhydrides or esters in presence of a base (pyridine, removing HCl) to give N-substituted amides; benzoyl chloride gives benzoylated derivatives (Schotten-Baumann benzoylation) (NCERT §9.6.2-9.6.3, p. 270).
- Carbylamine reaction: 1° aliphatic and aromatic amines + $CHCl_3$ + alcoholic KOH (Δ) → foul-smelling isocyanides (carbylamines) R–NC; 2° and 3° amines give no such reaction — diagnostic test for 1° amines: $R–NH_2 + CHCl_3 + 3KOH \rightarrow R–NC + 3KCl + 3H_2O$ (NCERT §9.6.4, p. 271).
- Reaction with HNO_2 (nitrous acid generated in situ from $NaNO_2$ + dil. HCl): 1° aliphatic amines → unstable aliphatic diazonium salts which liberate N_2 quantitatively and form alcohols (Van Slyke method for amino-acid estimation); 1° aromatic amines at 273-278 K → stable aromatic diazonium salts (diazotisation); 2° amines give yellow oily N-nitrosoamines ($R_2N–NO$); 3° amines react differently (form a soluble salt with HCl, then react with HNO_2 to give an N-nitroso ammonium compound) (NCERT §9.6.5, p. 271).
- Hinsberg test with benzenesulphonyl chloride ($C_6H_5SO_2Cl$): 1° amine → N-alkylbenzenesulphonamide bearing an N–H that is acidic (SO_2 group withdraws e^-), hence soluble in alkali; 2° amine → N,N-dialkylbenzenesulphonamide (no acidic N–H), insoluble in alkali; 3° amine → no reaction (no N–H to react); p-toluenesulphonyl chloride is now preferred (NCERT §9.6.6, p. 271-272).
- Electrophilic substitution on aniline: –NH_2 is a powerful o/p-directing activating group; bromination with bromine water at room temperature gives white 2,4,6-tribromoaniline (over-reaction); to obtain monosubstituted products, –NH_2 is protected by acetylation (acetic anhydride → acetanilide), substitution performed, then hydrolysed back to the amine — gives mainly p-bromoaniline (NCERT §9.6.7(a), p. 272-273).
- Nitration of aniline directly gives tarry oxidation products and significant m-nitroaniline (anilinium ion in strong acid is meta-directing; ratio o : m : p ≈ 19 : 47 : 51); after acetylation, nitration gives p-nitroacetanilide as major product, hydrolysed to p-nitroaniline (NCERT §9.6.7(b), p. 273).
- Sulphonation of aniline with conc. H_2SO_4 → anilinium hydrogensulphate → on heating at 453-473 K → p-aminobenzenesulphonic acid (sulphanilic acid, exists as a zwitterion); aniline does not undergo Friedel-Crafts reaction (alkylation or acylation) because it forms a salt with $AlCl_3$, making N positively charged (strong deactivator) (NCERT §9.6.7(c), p. 273).

- Diazonium salts have formula $R–N_2^+X^-$ where R is aryl and X^- is Cl^-, Br^-, HSO_4^-, BF_4^-; named by attaching "diazonium" to the parent hydrocarbon name followed by anion name; arenediazonium ion is stabilised by resonance over the ring carbons (NCERT §II, p. 274).
- Diazotisation: aniline + $NaNO_2$ + 2HCl at 273-278 K → $C_6H_5N_2^+Cl^-$ + NaCl + $2H_2O$; diazonium salts are unstable in the dry state (explosive) and must be used immediately in solution (NCERT §9.7, p. 274).
- Properties: benzenediazonium chloride is a colourless crystalline solid, water-soluble, stable in cold but reacts with warm water; benzenediazonium fluoroborate is water-insoluble and stable at room temperature (NCERT §9.8, p. 275).
- Replacement reactions (loss of N_2): Sandmeyer with Cu_2Cl_2/Cu_2Br_2/CuCN gives Ar–Cl, Ar–Br, Ar–CN; Gatterman uses Cu powder + HX; KI gives Ar–I directly (no Cu needed); HBF_4 then heat (Balz-Schiemann) gives Ar–F; mild reducing agents (H_3PO_2 or ethanol) give Ar–H; warming in water (283 K) gives phenol; $NaNO_2$/Cu with diazonium fluoroborate gives Ar–NO_2 (NCERT §9.9 A, p. 275-276).
- Coupling reactions (retention of diazo group): benzenediazonium chloride + phenol (in mildly alkaline medium) → p-hydroxyazobenzene (orange dye); + aniline (in mildly acidic medium) → p-aminoazobenzene (yellow); the resulting azo compounds (–N=N–) are coloured and used as dyes (NCERT §9.9 B, p. 276).
- Importance: diazonium salts enable introduction of –F, –Cl, –Br, –I, –CN, –OH, –NO_2 into aromatic rings — aryl fluorides and iodides cannot be made by direct halogenation, and –CN cannot be introduced by direct nucleophilic substitution of chlorobenzene (NCERT §9.10, p. 276-277).

2.2 Definitions to memorise

Term	Definition	Page
Primary amine (1°)	$R–NH_2$ — one H of NH_3 replaced by alkyl/aryl group	260
Secondary amine (2°)	R–NHR′ — two H atoms of NH_3 replaced	260
Tertiary amine (3°)	R_3N — all three H atoms of NH_3 replaced	260
Simple vs mixed amine	All alkyl/aryl groups same = simple; different = mixed	260
Quaternary ammonium salt	$R_4N^+X^-$ formed by exhaustive alkylation of amine	263
Ammonolysis	Cleavage of C–X bond by NH_3 giving amine + HX (sealed tube, 373 K)	262
Hofmann bromamide degradation	Amide + Br_2 + NaOH → 1° amine with one C less	264
Gabriel phthalimide synthesis	Phthalimide → K-phthalimide → alkyl halide → hydrolysis to give 1° aliphatic amine	264
Mendius reduction		263

Term	Definition	Page
	Reduction of nitrile $R{-}CN$ with Na/C_2H_5OH or H_2/Ni → 1° amine with one C more	
Diazotisation	Conversion of 1° aromatic amine to arenediazonium salt with $NaNO_2/HCl$ at 273-278 K	274
Carbylamine reaction	1° amine + $CHCl_3$ + alc. KOH → $R{-}NC$ (isocyanide); diagnostic for 1° amines	271
Hinsberg test	$C_6H_5SO_2Cl$ distinguishes 1°/2°/3° amines by alkali-solubility of the sulphonamide	271
Sandmeyer reaction	$Ar{-}N_2^+X^- + Cu_2X_2 \rightarrow Ar{-}X$ (X = Cl, Br, CN)	275
Gatterman reaction	$Ar{-}N_2^+X^- + Cu/HX \rightarrow Ar{-}X$ (less efficient than Sandmeyer)	275
Balz-Schiemann reaction	$Ar{-}N_2^+BF_4^- \xrightarrow{\Delta} Ar{-}F + N_2 + BF_3$	275
Coupling reaction	$Ar{-}N_2^+ + ArOH$ or $ArNH_2 \rightarrow Ar{-}N{=}N{-}Ar'$ (azo dye)	276
Schotten-Baumann reaction	Benzoylation of 1°/2° amine with C_6H_5COCl in presence of NaOH	270
Acetanilide	$C_6H_5NHCOCH_3$ — N-protected aniline used to moderate ring substitution	272
pKb	–log Kb; smaller pKb = stronger base	267
Aniline	$C_6H_5NH_2$ = benzenamine; weakest of common amines (pKb 9.38)	269
Isocyanide	$R{-}N{\equiv}C$ (carbylamine); foul-smelling; obtained from 1° amine + $CHCl_3$ + KOH	271
N-Nitrosoamine	$R_2N{-}NO$; yellow oil formed from 2° amine + HNO_2	271
Invert/azo dye	Coloured –N=N– compound from diazonium salt + activated arene	276

2.3 Diagrams / processes to remember

- **Fig. 9.1, p. 260** — pyramidal shape of trimethylamine, three C–N bonds with the lone pair occupying the fourth tetrahedral position; C–N–C angle = 108°, slightly less than tetrahedral 109.5° due to lone-pair compression.
- **Fig. 9.2, p. 266** — intermolecular hydrogen bonding in primary amines: N–H···N chains explain why 1° amines boil higher than 2° (one N–H per N) and 3° amines (no N–H); diagram contrasts the H-bonded network in $CH_3CH_2NH_2$ with the absence of such bonding in $(CH_3)_3N$.
- **Table 9.1, p. 261** — common vs IUPAC names of alkylamines and arylamines (methylamine = methanamine; ethylamine = ethanamine; aniline = benzenamine; N,N-dimethylmethanamine for trimethylamine).

- **Table 9.2, p. 266** — boiling points of amines, alcohols, alkanes of similar molar mass showing 1° > 2° > 3° amine order (n-butylamine 350.8 K > diethylamine 329.3 K > N,N-dimethylethylamine 310 K) and alcohol > amine (n-butanol 390.3 K).
- **Table 9.3, p. 267** — pKb values: methanamine 3.38, dimethylamine 3.27, trimethylamine 4.22, ethanamine 3.29, aniline 9.38, N-methylaniline 9.30, N,N-dimethylaniline 8.92 — useful for ordering basicity.
- **Resonance structures of aniline (five) vs anilinium ion (two), p. 269** — diagram of how the lone pair on N is donated into the ring in three Kekulé-equivalent canonical forms plus two ortho/para charge-separated forms, lowering the energy of the free amine more than the protonated ion → reduced basicity.
- **Sandmeyer / Gatterman reaction equations, p. 275** — Cu(I) catalysed replacements of $–N_2^+$ by –Cl, –Br, –CN; mechanism involves radical-pair intermediate with Cu(II)X species; arrows showing $C_6H_5N_2^+ + CuCl \rightarrow C_6H_5Cl + N_2 + Cu^+$.
- **Coupling reaction scheme, p. 276** — formation of p-hydroxyazobenzene (from phenol, mildly alkaline pH 9-10) and p-aminoazobenzene (from aniline, mildly acidic pH 4-5); electrophile is the arenediazonium ion; coupling para to the activating –OH or $–NH_2$ group.
- **Acetanilide protection scheme, p. 272-273** — flowchart: aniline → (Ac_2O / pyridine) → acetanilide → (Br_2 / CH_3COOH) → p-bromoacetanilide → (H_3O^+) → p-bromoaniline; shows how moderation prevents tribromination.
- **Carbylamine test arrow-pushing, p. 271** — formation of dichlorocarbene from $CHCl_3 + OH^-$, attack on $R–NH_2$, elimination of 2 HCl to give R–NC; only 1° amines have two replaceable N–H atoms.

2.4 Common confusions / NTA trap points

- Gas-phase basicity follows pure +I logic (3° > 2° > 1° > NH_3), but aqueous phase order is irregular due to solvation + steric hindrance; do NOT generalise either way — NCERT specifies methyl series as $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$ (Table 9.3, p. 267-268).
- Hofmann bromamide gives amine with one C less; reduction of nitriles gives amine with one C more — these two routes are commonly swapped in distractors (p. 263-264). Acetamide (C-2) → methanamine (C-1); methyl cyanide (C-2) → ethylamine (C-2).
- Gabriel phthalimide synthesis works only for primary aliphatic amines; aromatic primary amines cannot be made because aryl halides do not undergo nucleophilic substitution with phthalimide anion (p. 264).
- Hinsberg test: 1° gives sulphonamide soluble in alkali (acidic N–H); 2° gives sulphonamide insoluble in alkali (no N–H); 3° does not react at all — students often reverse 1° and 2° solubility (p. 271-272).
- Carbylamine test is positive only for 1° amines (aliphatic and aromatic); 2° and 3° amines give negative result (p. 271).

- Aniline does NOT undergo Friedel-Crafts alkylation/acylation because aniline + $AlCl_3$ forms a salt putting positive charge on N, deactivating the ring (p. 273); the salt is $C_6H_5NH_2·AlCl_3$.
- Direct nitration of aniline gives substantial m-nitroaniline because in strong acid aniline is protonated to anilinium ion which is meta-directing — this contradicts the "amino is o/p-directing" rule and is a favourite trap (p. 273).
- HNO_2 + 1° aliphatic amine → alcohol + $N_2\uparrow$ (unstable RN_2^+ decomposes); but HNO_2 + 1° aromatic amine → stable ArN_2^+ at 273-278 K — students often confuse the two outcomes (p. 271).
- HNO_2 + 2° amine → N-nitrosoamine (yellow oil, $R_2N–NO$); 3° aliphatic amine → quaternary ammonium nitrite (water-soluble); 3° aromatic amine (N,N-dimethylaniline) → p-nitroso derivative (ring attack). All three outcomes are different — memorise each (p. 271).
- Diazonium coupling needs activated arenes (phenol, aniline, N,N-dimethylaniline); benzene itself does NOT couple. Students sometimes write coupling with toluene — wrong.
- Bromination of aniline with Br_2/H_2O gives the 2,4,6-tribromo product (not the mono); to get the mono-Br product, the amine must first be acetylated (p. 272-273).
- Reduction of $ArNO_2$ in acidic medium (Sn/HCl, Fe/HCl) gives $ArNH_2$; in neutral/alkaline medium gives intermediate products like ArN=NAr (azobenzene) or ArNHNHAr (hydrazobenzene) — easy to confuse with diazonium chemistry.

Practice MCQs

Q1. The C–N–C bond angle in trimethylamine is 108°. Which of the following best explains this value being less than the ideal tetrahedral angle of 109.5°?

A. Nitrogen in trimethylamine is sp^2 hybridised

B. The lone pair on nitrogen occupies more space than a bond pair, compressing the C–N–C angle

C. Steric repulsion between the methyl groups widens the bond angle from the tetrahedral value

D. The three C–N bonds are formed by unhybridised p-orbitals of nitrogen

Q2. **Which of the following is the correct IUPAC name of $(CH_3CH_2)_3N$?**

- **A.** Triethylamine
- **B.** N,N-Diethylethanamine
- **C.** N-Ethyl-N-ethylethanamine
- **D.** Tris-ethanamine

Q3. **The Gabriel phthalimide synthesis is not suitable for the preparation of aromatic primary amines because:**

- **A.** Phthalimide does not react with ethanolic KOH
- **B.** Aryl halides do not undergo nucleophilic substitution with the anion of phthalimide
- **C.** The aromatic amine formed is too unstable
- **D.** Alkaline hydrolysis of N-arylphthalimide gives a secondary amine

📊 PYQ Alignment

This unit is among the highest-yielding chapters in CUET (UG) Chemistry, generating roughly 8–10 MCQs per year in 2023-25 papers. Typical questions probe product prediction (Hofmann bromamide, Gabriel, Sandmeyer, coupling), distinguishing tests (Hinsberg, carbylamine, nitrous acid behaviour of 1°/2°/3°), basicity ordering of substituted anilines and ethyl/methyl amines, and short conversion sequences using diazonium chemistry — exactly the question types modelled above.

CUET 2025 — Actual PYQs from this chapter

Q.11 (CUET 2025) Which of the following does not represent correct application of coordination compounds?

- A) cis-platin effective in tumours B) chlorophyll helps in photosynthesis C) desferrioxamine B used for lead poisoning D) cyanocobalamin (vitamin B_{12}) is a coordination compound of Co

Tests: Amines — basicity and structure Answer: Not in extracted key

Q.18 (CUET 2025) Decreasing order of field strength of ligands: (A) S^{2-} (B) Ethylenediamine (C) NCS^- (D) CN^- Options given.

- A) — B) — C) — D) —

Tests: Amines — basicity and structure Answer: Not in extracted key

Q.23 (CUET 2025) Gabriel phthalimide synthesis is used for preparation of:

- A) tertiary amine B) acid synthesis C) primary amine D) secondary amine

Tests: Named reactions for amines Answer: Not in extracted key

Q.24 (CUET 2025) The reaction shown (Wurtz reaction of alkyl halides with Na in dry ether) is an example of:

- A) Sandmeyer reaction B) Wurtz reaction C) Kolbe reaction D) Fittig reaction

Tests: Named reactions for amines Answer: Not in extracted key

Q.32 (CUET 2025) Nitrogen atom in amines is trivalent with lone pair. Geometry of trimethyl amine is:

- A) Tetrahedral B) Pyramidal C) Square planar D) Trigonal planar

Tests: Amines — basicity and structure Answer: Not in extracted key

Q.35 (CUET 2025) Which compound will not give azo coupling with benzene diazonium chloride?

- A) Nitrobenzene B) Aniline C) o-Toluidine D) Phenol

Tests: Diazonium salts Answer: Not in extracted key

Q.39 (CUET 2025) Match amino acids with one letter code: Lysine, Tryptophan, Tyrosine, Glutamine Codes: W, Q, K, Y.

- A) — B) — C) — D) —

Tests: Amines — basicity and structure Answer: Not in extracted key

CUET 2024 — Actual PYQs from this chapter

Q.13 (CUET 2024) Reaction of aniline with conc. HNO_3 and H_2SO_4 (298 K) gives 47% of:

- A) p-Nitroaniline B) o-Nitroaniline C) m-Nitroaniline D) 2,4-Dinitroaniline

Tests: Aniline reactivity Answer: Not in extracted key

Q.21 (CUET 2024) Aniline does not undergo Friedel-Crafts reaction because: (A) forms salt with $AlCl_3$ (B) N gets negative charge (C) N gets positive charge (D) N acts as deactivating group Options given.

- A) — B) — C) — D) —

Tests: Aniline reactivity Answer: Not in extracted key

Q.26 (CUET 2024) Match reactions: Swarts, Finkelstein, Sandmeyer, Wurtz.

- A) — B) — C) — D) —

Tests: Named reactions for amines **Answer:** Not in extracted key

Q.27 (CUET 2024) Match biomolecules with diseases/functions: Vitamin A, Thiamine, Glucocorticoids, Estradiol.

- A) — B) — C) — D) —

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.14 (CUET 2024) Increasing order of basic strength: $C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$, $C_6H_5NH_2$ Options given.

- A) — B) — C) — D) —

Tests: Amines — basicity ordering **Answer:** Not in extracted key

CUET 2023 — Actual PYQs from this chapter

Q.10 (CUET 2023) In amines, nitrogen atom is A and B hybridised, making geometry C. A, B and C respectively are:

- A) Trivalent, sp^2, trigonal B) Tetravalent, sp^3, tetrahedral C) Trivalent, sp^3, pyramidal D) Tetravalent, sp^2, pyramidal

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.27 (CUET 2023) Glucose does not react with:

- A) Conc. HNO_3 B) Acetic anhydride C) Hydroxylamine D) Sodium bisulphite

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.29 (CUET 2023) Positive carbylamine test is shown by:

- A) N-Methylaniline B) N,N-Dimethylaniline C) Triethylamine D) p-Methylbenzylamine

Tests: Named reactions for amines **Answer:** Not in extracted key

Q.33 (CUET 2023) Arrange the following amines in the order of decreasing basic character in gaseous phase: (A) NH_3 (B) CH_3NH_2 (C) $(CH_3)_2NH$ (D) $(CH_3)_3N$ Options:

- A) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$ B) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$ C) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > NH_3$ D) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH > NH_3$

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.35 (CUET 2023) D(+)-Glucose reacts with hydroxylamine and forms oxime. The correct structure of the oxime is:

- A) Structure (1) B) Structure (2) C) Structure (3) D) Structure (4)

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.38 (CUET 2023) Amongst the following, identify the condensation polymers: (A) Bakelite (B) Teflon (C) Melamine formaldehyde resin (D) Nylon-2 nylon-6 (E) Buna-S Options:

- A) (B) and (E) only B) (A), (C) and (D) only C) (C) and (D) only D) (A), (B) and (E) only

Tests: Amines — basicity and structure **Answer:** Not in extracted key

Q.47 (CUET 2023) Name the reaction shown (Phenol → Salicylaldehyde using $CHCl_3$/NaOH):

- A) Williamson synthesis B) Kolbe’s reaction C) Reimer-Tiemann reaction D) Sandmeyer reaction

Tests: Named reactions for amines **Answer:** Not in extracted key