Interactive Practice & Step-by-Step Solutions: Click any question to solve it with timer & full explanation on The Crucible.

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JEE Main 2025 · Shift-I — View Solution on Crucible ↗

1. The products A and B in the following reactions, respectively are: $A \xleftarrow{Ag\text{-}NO_2} CH_3-CH_2-CH_2-Br \xrightarrow{AgCN} B$

(A) $CH_3CH_2CH_2-ONO$, $CH_3CH_2CH_2-NC$

(B) $CH_3CH_2CH_2-ONO$, $CH_3CH_2CH_2-CN$

(C) $CH_3CH_2CH_2-NO_2$, $CH_3CH_2CH_2-CN$

(D) $CH_3CH_2CH_2-NO_2$, $CH_3CH_2CH_2-NC$

Steam Distillation · JEE Main 2025 · Shift-I — View Solution on Crucible ↗

2. The steam volatile compounds among the following are: (A) 2-nitrophenol (OH and NO_2 ortho), (B) 2-nitroaniline (NH_2 and NO_2 ortho), (C) 4-aminophenol (NH_2 and OH para), (D) 4-nitroaniline (NH_2 and NO_2 para)

(A) (B) and (D) only

(B) (A) and (C) only

(C) (A) and (B) only

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

Carbocation — structure & stability · JEE Main 2025 · Shift-II — View Solution on Crucible ↗

3. Which among the following halides will generate the most stable carbocation in Nucleophilic substitution reaction?

(A) Allyl bromide

(B) Bromobenzene

(C) Cyclohexyl bromide

(D) Triphenylmethyl bromide

Structure & physical properties · JEE Main 2025 · Shift-II — View Solution on Crucible ↗

4. The alkane from below having two secondary hydrogens is:

(A) 2,2,4,5-Tetramethylheptane

(B) 2,2,3,3-Tetramethylpentane

(C) 4-Ethyl-3,4-dimethyloctane

(D) 2,2,4,4-Tetramethylhexane

Ambident Nucleophiles · JEE Main 2024 · Shift-II — View Solution on Crucible ↗

5. Alkyl halide is converted into alkyl isocyanide by reaction with

(A) NaCN

(B) NH_4CN

(C) KCN

(D) AgCN

Chromatography · JEE Main 2024 · Shift-II View Solution on Crucible ↗

6. Chromatographic technique/s based on the principle of differential adsorption is/are A. Column chromatography B. Thin layer chromatography C. Paper chromatography Choose the most appropriate answer from the options given below:

(A) B only
(B) A only
(C) A & B only
(D) C only

Carbocation — structure & stability · JEE Main 2025 · Shift-I View Solution on Crucible ↗

7. Which one of the carbocations from the following is most stable?

(A) $\overset{+}{C}H_2$–CH=CH–CH_2–O–CH_3
(B) $\overset{+}{C}H_2$–CH=CH–O–CH_3
(C) $\overset{+}{C}H_2$–CH=CH–O–C(=O)–CH_3
(D) $\overset{+}{C}H_2$–CH=CH–F

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conformational_analysis · JEE Main 2019 · Shift-II View Solution on Crucible ↗

8. Which of these factors does not govern the stability of a conformation in acyclic compounds?

(A) Torsional strain
(B) Angle strain
(C) Steric interactions
(D) Electrostatic forces of interaction

Polyhalogen Compounds: Uses & Structures Match · JEE Main 2023 · Shift-II View Solution on Crucible ↗

9. In the following halogenated organic compounds the one with maximum number of chlorine atoms in its structure is:

(A) Chloral
(B) Gammaxene
(C) Chloropicrin
(D) Freon -12

Column Chromatography · JEE Main 2023 · Shift-I View Solution on Crucible ↗

10. Using column chromatography, mixture of two compounds 'A' and 'B' was separated. 'A' eluted first, this indicates 'B' has

(A) Low R_f, weaker adsorption
(B) High R_f, stronger adsorption
(C) High R_f, weaker adsorption
(D) Low R_f, stronger adsorption

JEE Main 2024 · Shift-I View Solution on Crucible ↗

11. Cyclohexene is _____ type of an organic compound. (a) Benzenoid aromatic (b) Benzenoid non-aromatic (c) Acyclic (d) Alicyclic

(A) Benzenoid aromatic
(B) Benzenoid non-aromatic
(C) Acyclic
(D) Alicyclic

Structure, stability & physical properties · JEE Main 2024 · Shift-I View Solution on Crucible ↗

12. Number of σ and π bonds present in ethylene molecule is respectively:

(A) 3 and 1
(B) 5 and 2
(C) 4 and 1
(D) 5 and 1

Leaving Group Ability Order · JEE Advanced 2001 View Solution on Crucible ↗

13. The compound that will react most readily with NaOH to form methanol is

(A) $(\mathrm{CH_3})_4\mathrm{N^+\,I^-}$
(B) $\mathrm{CH_3OCH_3}$
(C) $(\mathrm{CH_3})_3\mathrm{S^+\,I^-}$
(D) $(\mathrm{CH_3})_3\mathrm{CCl}$

Kjeldahl Method · JEE Main 2024 · Shift-I View Solution on Crucible ↗

14. In Kjeldahl's method for estimation of nitrogen, $\mathrm{CuSO_4}$ acts as:

(A) Reducing agent
(B) Catalytic agent
(C) Hydrolysis agent
(D) Oxidising agent

Stability comparison of Intermediates · JEE Main 2024 · Shift-I View Solution on Crucible ↗

15. Ionic reactions with organic compounds proceed through: (A) Homolytic bond cleavage (B) Heterolytic bond cleavage (C) Free radical formation (D) Primary free radical (E) Secondary free radical

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

Nitration & Sulfonation · JEE Main 2021 · Shift-II View Solution on Crucible ↗

16. Benzene on nitration gives nitrobenzene in presence of HNO_3 and H_2SO_4 mixture, where:

(A) Both H_2SO_4 and HNO_3 act as bases

(B) Both H_2SO_4 and HNO_3 act as acids

(C) HNO_3 acts as a base and H_2SO_4 acts as an acid

(D) HNO_3 acts as an acid and H_2SO_4 acts as a base

Chemical Tests for Halides ($AgNO_3$, Beilstein) · JEE Main PYQ View Solution on Crucible ↗

17. p-Chloroaniline and anilinium chloride can be distinguished by

(A) Sandmeyer reaction

(B) Carbylamine reaction

(C) Hinsberg's reaction

(D) $AgNO_3$

Dumas Method · JEE Main 2025 · Shift-II View Solution on Crucible ↗

18. In Dumas' method for estimation of nitrogen, 0.5 gram of an organic compound gave 60 mL of nitrogen collected at 300 K temperature and 715 mm Hg pressure. The percentage composition of nitrogen in the compound (Aqueous tension at $300\ K = 15\ mm\ Hg$) is

(A) 1.257

(B) 20.87

(C) 18.67

(D) 12.57

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electrophiles & nucleophiles · JEE Main 2025 · Shift-I View Solution on Crucible ↗

19. Total number of nucleophiles from the following is: NH_3, PhSH, $(H_3C)_2S$, $H_2C{=}CH_2$, OH^-, H_3O^+, $(CH_3)_2CO$, $(CH_3)_2C{=}N{-}CH_3$

(A) 6

(B) 4

(C) 5

(D) 7

JEE Main 2023 · Shift-II View Solution on Crucible ↗

20. The one giving maximum number of isomeric alkenes on dehydrohalogenation reaction is (excluding rearrangement):

(A) 1-Bromo-2-methylbutane

(B) 2-Bromopropane

(C) 2-Bromopentane

(D) 2-Bromo-3,3-dimethylpentane

Benzyne Mechanism · WBJEE 2025 View Solution on Crucible ↗

21. The major product (F) in the following reaction is: 3-chloroanisole (1-chloro-3-methoxybenzene) is treated with $NaNH_2$ in liquid NH_3.

(A) o-Anisidine
(B) m-Anisidine
(C) p-Anisidine
(D) p-Chloroaniline

Test for Nitrogen · JEE Main 2024 · Shift-I View Solution on Crucible ↗

22. Which of the following nitrogen containing compound does not give Lassaigne's test?

(A) Phenyl hydrazine
(B) Glycene
(C) Urea
(D) Hydrazine

Resonance / Mesomeric effect (±M) · JEE Main 2024 · Shift-II View Solution on Crucible ↗

23. Correct carbocation stability order:

(A) 3° > 1° > 2° > methyl
(B) methyl > 2° > 1° > 3°
(C) 3° > 2° > 1° > methyl
(D) 1° > 2° > methyl > 3°

Anti markovnikov addition & Peroxide effect · JEE Main 2019 · Shift-II View Solution on Crucible ↗

24. Which one of the following alkenes when treated with HCl yields majorly an anti-Markovnikov product?

(A) $F_3C-CH=CH_2$
(B) $Cl-CH=CH_2$
(C) $CH_3O-CH=CH_2$
(D) $H_2N-CH=CH_2$

Comparison: Alkyl vs Aryl Halides · JEE Main PYQ View Solution on Crucible ↗

25. Which of the following reagents can be used to distinguish chlorobenzene from chlorocyclohexane?

(A) $AgNO_3/C_2H_5OH$
(B) $Ag(NH_3)_2OH$
(C) Na fusion; HNO_3; $AgNO_3$
(D) Br_2/CCl_4

Test for Nitrogen · JEE Main 2023 · Shift-I View Solution on Crucible ↗

26. A solution of $FeCl_3$ when treated with $K_4[Fe(CN)_6]$ gives a prussiun blue precipitate due to the formation of

(A) $K[Fe_2(CN)_6]$ **(B)** $Fe[Fe(CN)_6]$

(C) $Fe_3[Fe(CN)_6]_2$ **(D)** $Fe_4[Fe(CN)_6]_3$

Comparative acidity/basicity reasoning chains · JEE Main 2024 · Shift-I View Solution on Crucible ↗

27. A species with carbon having sextet of electrons, acting as electrophile:

(A) carbon free radical **(B)** carbanion

(C) carbocation **(D)** pentavalent carbon

Preparation Reactions of Benzene · JEE Main 2022 · Shift-II View Solution on Crucible ↗

28. Decarboxylation of all six possible forms of diaminobenzoic acids $C_6H_3(NH_2)_2COOH$ yields three product A, B and C. Three acids give a products 'A', two acids gives a products 'B', and one acid give a product 'C'. The melting point of product 'C' is:

(A) $63^\circ C$ **(B)** $90^\circ C$

(C) $104^\circ C$ **(D)** $142^\circ C$

SN1 Substrate Preference · JEE Main 2026 · Shift-I View Solution on Crucible ↗

29. The correct order of the rate of reaction of the following reactants with nucleophile by S_N1 mechanism is : (Given : Structure I and II are rigid)

(A) IV < III < II < I **(B)** III < I < II < IV

(C) II < I < III < IV **(D)** I < II < III < IV

Test for Sulfur · JEE Main 2025 · Shift-II View Solution on Crucible ↗

30. Formation of $Na_4[Fe(CN)_5NOS]$, a purple coloured complex formed by addition of sodium nitroprusside in sodium carbonate extract of salt indicates the presence of:

(A) Sodium ion **(B)** Sulphate ion

(C) Sulphide ion **(D)** Sulphite ion

Answer Key (Q1 to Q30)

Click any question number below to open its exact step-by-step solution on The Crucible ↗

1: (D)	2: (C)	3: (D)	4: (B)	5: (D)	6: (C)	7: (B)	8: (B)	9: (B)	10: (D)
11: (D)	12: (D)	13: (C)	14: (B)	15: (C)	16: (C)	17: (D)	18: (D)	19: (C)	20: (C)
21: (B)	22: (D)	23: (C)	24: (A)	25: (A)	26: (D)	27: (C)	28: (D)	29: (C)	30: (C)

Sample Solution — Question 3 (Correct Option: D)

Open Full Solution on Crucible ↗

Q3. Which among the following halides will generate the most stable carbocation in Nucleophilic substitution reaction?

• *Step 1: Carbocation Stability in* S_N1*

Nucleophilic substitution (especially S_N1) involves a carbocation intermediate.

• **(d) Triphenylmethyl bromide:** Generates the **trityl cation**, which is stabilized by three phenyl rings via resonance. It is extremely stable.

• (a) Allyl: stabilized by one double bond.

• (b) Benzyl (if it were benzyl, but it's bromobenzene which gives an unstable aryl cation).

• (c) Cyclohexyl: secondary alkyl (relatively unstable).

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