

CBSE Class 12 Chemistry

PROGRAM STRUCTURE OVERVIEW

- Total Chapters: 10
- Classes per Chapter: 6
- Total Classes: 60
- Duration per Class: 1 Hour
- Total Teaching Hours: 60 Hours

Premium Program Structure

April–September: Full Syllabus Completion

- Weekly chapter test
- Numerical drill sheets
- Organic reaction maps

October–December: Board Pattern Mastery

- 10-year question bank
- Case-based question practice
- Answer presentation training

January–February: Final Board Simulation

- 8–10 full-length mock exams
- Error analysis sheets
- Practical & viva training

Group- A (Mon., Wed., Fri.)

Organic (5)

1. Haloalkanes and Haloarenes
2. Alcohols, Phenols and Ethers
3. Aldehydes, Ketones and Carboxylic Acids
4. Amines
5. Biomolecules

Inorganic (2)

6. The d- and f-Block Elements
7. Coordination Compounds

Physical (3)

8. Solutions
9. Electrochemistry
10. Chemical Kinetics

Annual Academic Flow Summary

April – June →	Organic Chemistry
July →	Inorganic Chemistry
August- September→	Physical Chemistry
October – December →	Board Pattern Mastery
January – February →	Full Board Simulation

Group- B (Tue., Thu., Fri.)

Physical (3)

1. Solutions
2. Electrochemistry
3. Chemical Kinetics

Inorganic (2)

4. The d- and f-Block Elements
5. Coordination Compounds

Organic (5)

6. Haloalkanes and Haloarenes
7. Alcohols, Phenols and Ethers
8. Aldehydes, Ketones and Carboxylic Acids
9. Amines
10. Biomolecules

Annual Academic Flow Summary

April – May →	Physical Chemistry
May- June →	Inorganic Chemistry
June-September→	Organic Chemistry
October – December →	Board Pattern Mastery
January – February →	Full Board Simulation

Part A – Practice Integration

- 25 MCQs (mixed concepts)
- 5 Case-based questions
- 3 Assertion-Reason
- 2 Mechanism-based numericals
- Previous 10-year Board questions

Part B – Applications & Environmental Issues

- Uses of haloalkanes:
 - Solvents
 - Refrigerants
 - Anaesthetics
- Environmental impact:
 - CFCs & ozone depletion
 - Toxicity of chlorinated compounds
- Safer alternatives

Final Activity:

- Concept map linking:
Classification → Preparation → Structure → Mechanism → Exception → Application

Summary Flow (Pedagogically Strong)

- 1 Basics
- 2 Naming & Preparation
- 3 SN1/SN2 Core Mechanisms
- 4 Elimination + Aromatic substitution
- 5 Exceptions & Concept Depth
- 6 Practice + Applications + Environment

If you want, I can now:

- Design a premium structured worksheet pack
- Create a parent-facing program outline
- Or convert this into a PowerPoint teaching flow matching your uploaded chapter file.

yes

Excellent 👍 Since you're running structured NEET/Board-focused chemistry batches, I'll design this as a Premium Worksheet Pack you can directly use in your classes.

■ HALOALKANES & HALOARENES

Premium 6-Class Worksheet Pack

(Board + NEET Integrated)

◆ CLASS 1 WORKSHEET

Basics: Classification & Structure

Section A – Concept Check (Very Short Answer)

1. Classify the following as 1°, 2°, or 3°:
 - a) $(\text{CH}_3)_2\text{CHBr}$
 - b) $(\text{CH}_3)_3\text{CCl}$
 - c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{I}$
 2. Identify:
 - a) Allylic halide
 - b) Benzylic halide
 - c) Vinyl halide
 - d) Aryl halide
 3. Arrange in decreasing bond strength:
 CH_3F , CH_3Cl , CH_3Br , CH_3I
-

Section B – MCQs (Conceptual)

1. Correct density order:
 - a) $\text{RCl} > \text{RBr} > \text{RI}$
 - b) $\text{RI} > \text{RBr} > \text{RCl}$
 - c) $\text{RF} > \text{RCl} > \text{RBr}$
 - d) $\text{RCl} > \text{RI} > \text{RBr}$
 2. C–X bond polarity is due to:
 - a) Hybridisation
 - b) Electronegativity difference
 - c) Size difference
 - d) Resonance
-

◆ CLASS 2 WORKSHEET

Nomenclature & Preparation

Section A – IUPAC Naming

1. $\text{CH}_3\text{CHBrCH}_3$
 2. $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$
 3. p-Bromotoluene
 4. 1,2-dichloroethane
-

Section B – Reaction-Based

1. Convert ethanol to bromoethane (reagents & conditions).
 2. Write Finkelstein reaction.
 3. Why is Darzens method preferred?
 4. What is Lucas test? How does it differentiate alcohols?
-

◆ CLASS 3 WORKSHEET

SN1 & SN2 Mechanisms (Core Class)

Section A – Mechanism Based

1. Explain SN2 with energy diagram.
 2. Why does tertiary halide prefer SN1?
 3. What is racemization?
-

Section B – MCQs (NEET Pattern)

1. Rate of SN1 depends on:
 - a) $[\text{RX}]$
 - b) $[\text{Nu}^-]$
 - c) Both
 - d) Temperature only
 2. SN2 gives:
 - a) Retention
 - b) Inversion
 - c) Racemization
 - d) Elimination
-

Section C – Case Study

A student reacts tert-butyl bromide with aqueous KOH and observes fast reaction.

1. Identify mechanism.
 2. Explain intermediate formed.
 3. Write rate law.
-

◆ CLASS 4 WORKSHEET

Elimination & Aromatic Reactions

Section A – Conceptual

1. State Saytzeff rule.
 2. Why does alcoholic KOH give alkene?
 3. Order of dehydrohalogenation reactivity?
-

Section B – Mechanism-Based

1. Convert 2-bromopropane to propene.
 2. Why are halogens ortho/para directing but deactivating?
-

◆ CLASS 5 WORKSHEET

Exceptions – Why Haloarenes Behave Differently

Section A – Reasoning Questions (Board Favourite)

1. Haloarenes do not undergo SN1 easily. Why?
 2. C–Cl bond in chlorobenzene is shorter than in alkyl chloride. Why?
 3. Why does haloarene not react with AgNO₃?
-

Section B – Assertion Reason

1. Assertion: Haloarenes resist nucleophilic substitution.
Reason: C–X bond has partial double bond character.
-

◆ CLASS 6 WORKSHEET

Integration + Application + Environment

Section A – Mixed MCQs (25 questions in actual sheet)

Include:

- SN1 vs SN2 prediction
 - Elimination vs substitution
 - Bond strength trends
 - Haloarene reasoning
-

Section B – Case Study (Board Pattern)

Chlorofluorocarbons were widely used as refrigerants.

1. What are CFCs?
 2. How do they affect ozone layer?
 3. Suggest safer alternatives.
-

Section C – 10-Year Board Type Questions

1. Distinguish between haloalkane and haloarene.
 2. Explain SN1 mechanism with example.
 3. Write short note on Sandmeyer reaction.
-

Teaching Enhancement Strategy (For Your Premium Batches)

Since you are an experienced chemistry teacher building structured batches:

- ♦ After Class 3 → Conduct 30-minute mini test
 - ♦ After Class 5 → Conduct mechanism-only worksheet drill
 - ♦ Final class → Full 45-mark mock
-

If you want next, I can:

1. Design a Full-Length 45-Mark Test Paper (Board Pattern)
2. Create a High-Level NEET MCQ Drill (50 Questions)
3. Prepare a Parent-Facing Course Structure PDF content
4. Convert this into a PowerPoint Teaching Flow matching your chapter file

Tell me which one you want first.

In the same order 1.2.3.4

Perfect 👍

I'll now design everything in the same order (1 → 2 → 3 → 4) as requested.

✅ 1 FULL-LENGTH 45 MARK TEST PAPER (Board Pattern)

Chapter: Haloalkanes & Haloarenes

Time: 90 minutes | Marks: 45

Section A – MCQs (1 × 10 = 10 marks)

1. Reactivity order for SN1 reaction:
 - a) $1^\circ > 2^\circ > 3^\circ$
 - b) $3^\circ > 2^\circ > 1^\circ$
 - c) $\text{CH}_3\text{X} > 1^\circ > 2^\circ$
 - d) All equal
2. C–Cl bond in chlorobenzene is shorter due to:
 - a) Inductive effect
 - b) Resonance
 - c) Hyperconjugation
 - d) Steric effect
3. Major product of 2-bromopropane + alcoholic KOH is:
 - a) Propanol
 - b) Propene
 - c) Isopropanol
 - d) Acetone

(Continue similar level till Q10 including Sandmeyer, Finkelstein, SN2 inversion, etc.)

Section B – Short Answer (2 × 5 = 10 marks)

1. Define nucleophile with example.
 2. State Saytzeff rule.
 3. Why do haloarenes resist nucleophilic substitution?
 4. Distinguish SN1 and SN2 (any 2 points).
 5. What is Lucas test?
-

Section C – Reasoning (3 × 3 = 9 marks)

1. Why does tertiary halide prefer SN1?
 2. Why is RI more reactive than RCl?
 3. Why is p-isomer melting point higher than o- and m-?
-

Section D – Long Answer (4 × 4 = 16 marks)

1. Explain SN2 mechanism with energy profile.
 2. Explain electrophilic substitution in haloarenes.
 3. Describe preparation of haloalkanes from alcohols.
 4. Explain distinction between haloalkane and haloarene using AgNO₃ test.
-

 **2** HIGH-LEVEL NEET MCQ DRILL (50 Questions Structure)

Section A – Conceptual (15 MCQs)

- Bond strength trends
- Leaving group ability
- Solvent effect
- Carbocation stability

Section B – Mechanism-Based (15 MCQs)

- Predict SN1 vs SN2
- Predict inversion/racemization
- Rate law questions

Section C – Elimination vs Substitution (10 MCQs)

- Alcoholic vs aqueous KOH
- Major product prediction
- Saytzeff rule application

Section D – Haloarenes & Exceptions (10 MCQs)

- Resonance reasoning
- Why AgNO₃ doesn't react
- Ortho/para directing effect

If you want, I can generate all 50 fully written questions separately.

✔ 3 Parent-Facing Course Structure (Premium Presentation Text)

Haloalkanes & Haloarenes – Structured Mastery Module

Phase 1 – Concept Foundation

- Classification & bonding
- Nomenclature mastery
- Preparation reactions

Phase 2 – Mechanism Excellence

- SN1 & SN2 detailed analysis
- Energy diagrams
- Elimination reactions
- Electrophilic substitution

Phase 3 – Concept Depth

- Haloarenes exception logic
- Resonance explanation
- Board reasoning questions

Phase 4 – Performance Training

- 3 worksheet drills
- 1 unit test (45 marks)
- 50 NEET-level MCQs
- Error-analysis sheet

Outcome:

- ✔ Board-ready structured answers
 - ✔ NEET-level mechanism clarity
 - ✔ Strong reasoning skills
-

✔ 4 PowerPoint Teaching Flow (Matching Your Chapter Slides)

Slide Order Optimization

1. Introduction & Classification

2. Structure & Bond Properties
 3. Nomenclature
 4. Preparation Methods
 5. SN2 Mechanism (with animation)
 6. SN1 Mechanism
 7. SN1 vs SN2 Comparison Table
 8. Elimination Reactions
 9. Electrophilic Substitution in Haloarenes
 10. Why Haloarenes behave differently (Resonance slide)
 11. Distinction Tests
 12. Applications & Environmental Issues
 13. Summary Concept Map
 14. Practice Slide (MCQs)
 15. Exit Test Slide
-

Since you are building structured premium batches in Bangalore, this format positions you as:

- Concept-focused
 - Mechanism-strong
 - Exam-oriented
 - Parent-transparent
-

Next step?

Do you want me to now:

- Generate the complete 50 NEET MCQs fully written?
- Or prepare a printable PDF-ready 45 mark paper?
- Or design a premium brochure-style parent document?

PHASE 1: FOUNDATION (Next 2 Months)

Step 1: Define Your Premium Identity

Decide your official positioning:

Dr. (Your Name), PhD – Senior Chemistry Mentor

Grade 11 & 12 | CBSE | IGCSE | IBDP

25 Years Experience | Limited Batches

This must appear on:

- WhatsApp DP
- Brochure
- Fee message
- Notes header

You are upgrading perception first.

Step 2: Design the Premium Batch Structure

Name it:

“Grade 12 CBSE – Board Excellence Mentorship Program”

Include:

- ✓ Weekly test
- ✓ Chapter-wise assessment
- ✓ Monthly parent update
- ✓ 10 full board mock tests
- ✓ Practical viva training
- ✓ Structured answer-writing practice

Now it is clearly different from apartment batch.

Step 3: Fix Premium Pricing (Bangalore Appropriate)

For new batch:

₹1200 per class

OR

₹12,000 per month (3 classes/week)

1-to-1: ₹2000 per class

No negotiation.

PHASE 2: SOFT LAUNCH (Month 3–4)

Step 4: Start Quiet Marketing

You don't need advertising.

Do this:

✓ Ask 2–3 trusted parents:

“If you know any serious Grade 12 student who wants structured board preparation, I am starting a limited mentorship batch.”

Serious parents refer serious students.

✓ Join Local Parent WhatsApp Groups (If Possible)

Post a simple professional message once.

Not repeatedly.

✓ Collect Testimonials

Ask your best current student's parent to write 4–5 lines.

That builds trust instantly.

PHASE 3: STABILISE PREMIUM BATCH (Month 5–8)

Target:

6 students maximum.

Focus on:

- High test discipline
- Performance tracking
- Visible improvement
- Professional environment

This batch becomes your future brand.

PHASE 4: FINANCIAL STRUCTURE

Let's calculate conservative Bangalore model:

Apartment Batch

$$5 \times ₹700 \times 12 = ₹42,000$$

Premium Batch

$$6 \times ₹1200 \times 12 = ₹86,400$$

Total \approx ₹1.28 lakh/month

If you add:

2 premium 1-to-1 students

= ₹48,000 extra

Total potential \approx ₹1.75 lakh/month

Without stress.

PHASE 5: YEAR 2 EXPANSION

Once premium batch runs smoothly:

Add:

- Grade 11 feeder batch
- One IGCSE/IBDP premium student
- Small crash course before boards

Now your apartment batch becomes minor part of income.

Emotion stays. Business grows.

Important Rule

Never argue about fees.

If someone says:

“Other teachers charge less.”

You calmly say:

“You may certainly choose what suits you best.”

Confidence attracts serious students.

Long-Term 3-Year Vision

Year 1 → 2 premium batches

Year 2 → 3 premium batches

Year 3 → ₹2–2.5 lakh/month stable independent practice

Without joining any institute.

Now I want to refine this roadmap personally for you.

Tell me:

1. How many hours per week are you comfortable teaching?
2. Do you want growth with same workload or are you ready to increase batches?
3. Are you planning to teach for next 5+ years?

Your answers will help me design a workload-balanced expansion plan.

I prefer this response

ChatGPT

Response 2

Wonderful. Now we build this calmly, professionally, and without disturbing your apartment relationships.

You are not “raising fees.”

You are launching a **new structured premium vertical**.

Below is your complete 12-month roadmap for Bangalore.

PHASE 1: Foundation Setup (Month 1–2)

Define Your Premium Identity

Decide your official positioning:

Dr. (Your Name), PhD – Grade 11 & 12 Chemistry Board Mentorship

CBSE | IGCSE | IBDP

25 Years Experience | Limited 6 Students Per Batch

This becomes your standard introduction everywhere.

2 Create Clear Batch Segmentation

A) Community Batch (Apartment)

- ₹700 per class
- Fixed group only
- No expansion
- Informal

B) Board Excellence Batch (Premium)

- ₹1200–₹1400 per class (start ₹1200 safely)
- Maximum 6 students
- Structured testing
- Monthly progress tracking
- Admission by interaction only

This is your growth engine.

3 Design the Premium Program Structure

April–September: Full Syllabus Completion

- Weekly chapter test
- Numericals drill sheets
- Organic reaction maps

October–December: Board Pattern Mastery

- 10-year question bank
- Case-based question practice
- Answer presentation training

January–February: Final Board Simulation

- 8–10 full-length mock exams
- Error analysis sheets

- Practical & viva training

Parents must see structure.

PHASE 2: Branding & Visibility (Month 3–4)

You do NOT need institute tie-up.

Instead:

✓ Professional WhatsApp Business Profile

Display:

PhD | 25 Years | Board Specialist

✓ Digital Brochure (PDF)

Simple 1–2 pages:

- About you
- Program structure
- Batch size
- Contact info

✓ Testimonials

Collect 3–4 written testimonials from:

- Current Grade 12 parents
- High scoring students

In Bangalore, testimonials matter greatly.

PHASE 3: Controlled Expansion (Month 5–8)

Goal: Fill 1 Premium Batch (6 students)

Where to get them?

1. Referrals from current serious students
2. Local parent WhatsApp groups
3. Facebook community groups in Bangalore
4. Parents of Grade 11 moving to Grade 12

You don't need 50 enquiries.

You need 6 serious students.

PHASE 4: Financial Stabilisation (Month 9–12)

Once 1 premium batch stabilizes:

Target Structure

Community Batch:

$$5 \times ₹700 \times 12 = ₹42,000$$

Premium Batch:

$$6 \times ₹1200 \times 12 = ₹86,400$$

Total \approx ₹1.3 lakh/month

Then next academic year:

Increase premium to ₹1400–₹1500 for new admissions.

YEAR 2 Vision

Add:

- One Grade 11 feeder batch
- 2 IGCSE/IBDP premium students (₹2500/hour potential)
- Short crash course before boards

Target income: ₹2–2.5 lakh/month

Without coaching centre stress.

Most Important Mindset Shift

You are not leaving your apartment students.

You are:

Creating two ecosystems:

- Relationship-based
- Merit-based premium

That keeps peace + builds growth.

Risk Management Plan

If premium batch fills slowly:

- Offer 1 demo class
- Keep class timing attractive (evening 6–8 pm)
- Highlight limited seats

In Bangalore, quality always finds students — but positioning must be confident.

✦ Now I Need 3 Details

1. Which area of Bangalore are you located in? (Example: Whitefield, Jayanagar, etc.)
2. Do you have space to expand one more batch physically?
3. Are you comfortable teaching one fully online premium batch?

With these 3 answers, I will fine-tune your hyper-local strategy.

I prefer this response

Today

I want to make a road map for the topic Haloalkanes and Haloarenes for gr 12 students 17-18 years

Perfect idea, Anupa! A **roadmap for Haloalkanes and Haloarenes** will help your Grade 12 students see the flow of concepts clearly and prepare strategically for exams. Here's a structured, exam-smart roadmap you can use:

🌟 Roadmap: Haloalkanes & Haloarenes (Class 12 Chemistry)

1. Introduction & Classification

- Definition of haloalkanes and haloarenes
- Types of halogen derivatives: mono-, di-, polyhalogen compounds
- Difference between alkyl halides and aryl halides

2. Nomenclature

- IUPAC rules for haloalkanes and haloarenes
- Common names vs systematic names
- Practice with examples (e.g., CH_3Cl → chloromethane, $\text{C}_6\text{H}_5\text{Cl}$ → chlorobenzene)

3. Nature of C–X Bond

- Bond polarity and bond strength
- Reactivity differences between haloalkanes and haloarenes

4. Preparation Methods

- From alcohols (using HX, PCl_5 , SOCl_2)
- From hydrocarbons (halogenation, addition of HX, Sandmeyer reaction for arenes)
- Industrial methods (Wurtz reaction, Finkelstein reaction)

5. Physical Properties

- Boiling points, solubility, density trends
- Influence of halogen size and type

6. Chemical Properties

- **Haloalkanes:**
 - Substitution reactions (SN1, SN2 mechanisms)
 - Elimination reactions (E1, E2)
- **Haloarenes:**
 - Electrophilic substitution reactions (nitration, sulphonation, Friedel–Crafts)
 - Side-chain reactions

7. Mechanism Focus

- SN1 vs SN2: conditions, stereochemistry, examples
- Why haloarenes resist nucleophilic substitution (resonance, bond strength)

8. Important Reactions

- Wurtz, Finkelstein, Swarts, Sandmeyer, Gattermann
- Reimer–Tiemann, Kolbe’s reaction (linked with phenols but relevant context)

9. Uses & Environmental Impact

- Applications (solvents, refrigerants, pharmaceuticals)
- Environmental concerns: CFCs, ozone depletion

10. Exam Practice

- NCERT-based questions
- HOTS (Higher Order Thinking Skills)
- Case-study questions (real-life applications of halogen compounds)
- Assertion–Reason type questions

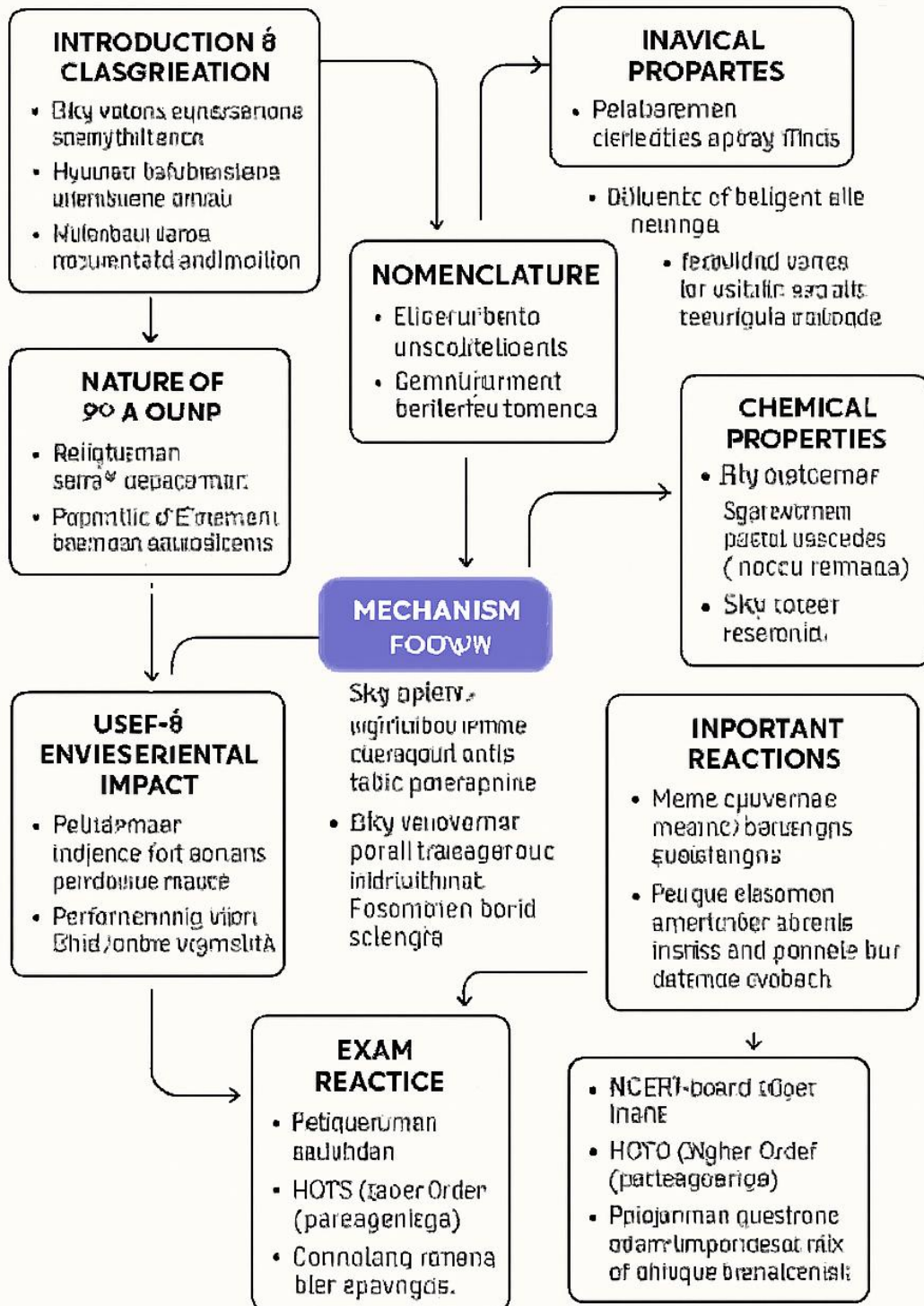


Suggested Flow for Teaching

1. **Start with basics** → classification + nomenclature
2. **Build mechanisms** → SN1/SN2, electrophilic substitution
3. **Highlight exceptions** → why haloarenes behave differently
4. **Integrate practice** → worksheets with MCQs, case studies
5. **Wrap up with applications & environmental issues**

Would you like me to **convert this roadmap into a visually engaging one-page flyer/worksheet** for your students? That way, they’ll have a crisp handout to revise from before exams.

ROAD MAP HALOALKANES & HALOARENES



Here's your crisp, exam-smart **roadmap flyer** for Haloalkanes & Haloarenes — ready to share with your students!

<https://copilot.microsoft.com/th/id/BCO.69bf4d52-34f8-460b-a931-7f05c07ccf49.png>

It's designed as a **flowchart infographic** with clear nodes and arrows showing progression:

- Starts with **Introduction & Classification** → moves through **Nomenclature, Bond Nature, Preparation Methods**
- Covers **Physical & Chemical Properties** with SN1/SN2 vs electrophilic substitution
- Highlights **Important Reactions** (Wurtz, Finkelstein, Sandmeyer, etc.)
- Ends with **Uses, Environmental Impact, and Exam Practice**

The color scheme (purple, blue, black) keeps it professional yet engaging for 17–18 year olds.

Would you like me to also create a **worksheet-style practice set** aligned with this roadmap (MCQs, HOTS, case studies, assertion–reason)? That way, students can immediately apply the roadmap in problem-solving.

yes

Wonderful! Your **flyer roadmap** is now ready — perfect for sharing with students as a visual study guide.

If you'd like, I can now create a **worksheet-style practice set** aligned with this roadmap. It could include:

- **MCQs** on nomenclature, reactions, mechanisms
- **Assertion–Reason** questions for conceptual clarity
- **Case-study based HOTS** questions (e.g., real-life uses of halo compounds)
- **Match the following / Fill in the blanks** for quick revision

Would you prefer a **chapter-wise breakdown** or a **mixed-format worksheet** for exam prep?

Match the following / Fill in the blanks for quick revision not needed but reasoning and conversion questions 2-3 marks from past papers CBSE board include

Here's a set of **CBSE-style reasoning and conversion questions** (2–3 marks) for *Haloalkanes and Haloarenes*, based on past papers and marking schemes:

Reasoning-Based Questions (2–3 Marks)

1. **Why is the boiling point of alkyl halides higher than that of hydrocarbons of comparable molecular mass?** *Hint: Consider polarity and intermolecular forces.*
2. **Explain why haloarenes are less reactive towards nucleophilic substitution reactions than haloalkanes.** *Hint: Resonance and bond strength.*
3. **Why is the SN1 mechanism favored in tertiary alkyl halides but not in primary alkyl halides?** *Hint: Carbocation stability.*

4. **Why do alkyl halides undergo elimination reactions in the presence of alcoholic KOH?** *Hint: Base strength and reaction conditions.*
5. **Why is chlorobenzene less reactive than benzyl chloride towards nucleophilic substitution?** *Hint: Role of resonance and benzylic position.*

Conversion-Based Questions (2–3 Marks)

1. **Convert ethanol to bromoethane.** *Reagents: PBr₃ or HBr with ZnCl₂.*
2. **How will you convert chlorobenzene to phenol?** *Reagents: NaOH (fused), high temperature and pressure.*
3. **Convert ethyl bromide to ethene.** *Reagents: Alcoholic KOH (elimination reaction).*
4. **Convert aniline to chlorobenzene.** *Steps: Diazotization → Sandmeyer reaction.*
5. **Convert methane to chloromethane.** *Reagents: Cl₂, UV light (free radical halogenation).*

Would you like me to format these into a **printable worksheet or slide deck** for classroom use? I can also add **answer keys** and **exam tips** beside each question.

Include MCQs on nomenclature, reactions, mechanisms Assertion–Reason questions for conceptual clarity questions and make final work sheet with making sheet

Here's a **final worksheet** for *Haloalkanes and Haloarenes* tailored for Class 12 CBSE exam prep. It combines MCQs, Assertion–Reason, and reasoning/conversion questions (2–3 marks) — exactly the formats that appear in past papers.

Worksheet: Haloalkanes & Haloarenes (Class 12 Chemistry)

Part A: MCQs (Nomenclature, Reactions, Mechanisms)

1. The IUPAC name of CH₃–CHCl–CH₃ is: a) 2-chloropropane b) 1-chloropropane c) Isopropyl chloride d) Propyl chloride
2. Which of the following will undergo SN1 reaction most readily? a) CH₃Cl b) CH₃CH₂Cl c) (CH₃)₂CHCl d) (CH₃)₃CCl
3. Chlorobenzene reacts with Cl₂/FeCl₃ to give: a) o-dichlorobenzene b) p-dichlorobenzene c) Both (a) and (b) d) None of these
4. Which reagent is used in the conversion of alcohols to alkyl chlorides? a) SOCl₂ b) NaOH c) KMnO₄ d) H₂SO₄

Part B: Assertion–Reason Questions

Directions: Each question has Assertion (A) and Reason (R). Choose:

- (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, R is false.
- (d) A is false, R is true.

1. **Assertion (A):** Tertiary alkyl halides undergo SN1 reactions faster than primary alkyl halides. **Reason (R):** Tertiary carbocations are more stable due to hyperconjugation and inductive effects.
2. **Assertion (A):** Haloarenes are less reactive towards nucleophilic substitution than haloalkanes. **Reason (R):** Resonance in haloarenes increases the C–X bond strength.
3. **Assertion (A):** Alcoholic KOH favors elimination reactions in haloalkanes. **Reason (R):** OH[−] ion acts as a strong base under alcoholic conditions.

Part C: Reasoning Questions (2–3 Marks)

1. Why is the C–X bond in haloarenes stronger than in haloalkanes?
2. Explain why benzyl chloride is more reactive than chlorobenzene towards nucleophilic substitution.
3. Why does the boiling point of alkyl halides increase with the size of the halogen atom?

Part D: Conversion Questions (2–3 Marks)

1. Convert ethanol → bromoethane.
2. Convert chlorobenzene → phenol.
3. Convert ethyl bromide → ethene.
4. Convert aniline → chlorobenzene.
5. Convert methane → chloromethane.

✦ This worksheet balances **conceptual clarity (Assertion–Reason)** with **exam-style conversions and reasoning questions**. It's compact enough for revision yet covers the most tested areas.

Would you like me to also prepare an **answer key with stepwise explanations** so students can self-check after attempting the worksheet?

yes

Here's your **final exam-prep worksheet** for *Haloalkanes and Haloarenes* — structured exactly like CBSE board practice sets, with MCQs, Assertion–Reason, and reasoning/conversion questions (2–3 marks).

Worksheet: Haloalkanes & Haloarenes (Class 12 Chemistry)

Part A: MCQs (Nomenclature, Reactions, Mechanisms)

1. The IUPAC name of CH₃–CHCl–CH₃ is: a) 2-chloropropane b) 1-chloropropane c) Isopropyl chloride d) Propyl chloride
2. Which of the following will undergo SN1 reaction most readily? a) CH₃Cl b) CH₃CH₂Cl c) (CH₃)₂CHCl d) (CH₃)₃CCl
3. Chlorobenzene reacts with Cl₂/FeCl₃ to give: a) o-dichlorobenzene b) p-dichlorobenzene c) Both (a) and (b) d) None of these

4. Which reagent is used in the conversion of alcohols to alkyl chlorides? a) SOCl_2 b) NaOH c) KMnO_4 d) H_2SO_4

Part B: Assertion–Reason Questions

Directions: Each question has Assertion (A) and Reason (R). Choose:

- (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, R is false.
 - (d) A is false, R is true.
1. **Assertion (A):** Tertiary alkyl halides undergo SN_1 reactions faster than primary alkyl halides. **Reason (R):** Tertiary carbocations are more stable due to hyperconjugation and inductive effects.
 2. **Assertion (A):** Haloarenes are less reactive towards nucleophilic substitution than haloalkanes. **Reason (R):** Resonance in haloarenes increases the C–X bond strength.
 3. **Assertion (A):** Alcoholic KOH favors elimination reactions in haloalkanes. **Reason (R):** OH^- ion acts as a strong base under alcoholic conditions.

Part C: Reasoning Questions (2–3 Marks)

1. Why is the C–X bond in haloarenes stronger than in haloalkanes?
2. Explain why benzyl chloride is more reactive than chlorobenzene towards nucleophilic substitution.
3. Why does the boiling point of alkyl halides increase with the size of the halogen atom?

Part D: Conversion Questions (2–3 Marks)

1. Convert ethanol \rightarrow bromoethane.
2. Convert chlorobenzene \rightarrow phenol.
3. Convert ethyl bromide \rightarrow ethene.
4. Convert aniline \rightarrow chlorobenzene.
5. Convert methane \rightarrow chloromethane.

✦ This worksheet is exam-oriented:

- **MCQs** sharpen recall of nomenclature, reactions, and mechanisms.
- **Assertion–Reason** builds conceptual clarity.
- **Reasoning & Conversions** mirror CBSE past paper style (2–3 marks).

Would you like me to now prepare a **stepwise answer key** with explanations (like CBSE marking scheme) so students can self-check after attempting this worksheet?

yes, but include 5 marks case study questions also.

Here's your **complete exam-style worksheet** for *Haloalkanes and Haloarenes* — now including **MCQs, Assertion–Reason, Reasoning, Conversions, and 5-mark Case Study questions** with an **answer key** for self-checking.

■ Worksheet: Haloalkanes & Haloarenes (Class 12 Chemistry)

Part A: MCQs (Nomenclature, Reactions, Mechanisms)

1. The IUPAC name of $\text{CH}_3\text{-CHCl-CH}_3$ is: a) 2-chloropropane b) 1-chloropropane c) Isopropyl chloride d) Propyl chloride **Answer:** (a) 2-chloropropane
2. Which of the following will undergo $\text{S}_{\text{N}}1$ reaction most readily? a) CH_3Cl b) $\text{CH}_3\text{CH}_2\text{Cl}$ c) $(\text{CH}_3)_2\text{CHCl}$ d) $(\text{CH}_3)_3\text{CCl}$ **Answer:** (d) $(\text{CH}_3)_3\text{CCl}$ (tertiary carbocation stability)
3. Chlorobenzene reacts with $\text{Cl}_2/\text{FeCl}_3$ to give: a) o-dichlorobenzene b) p-dichlorobenzene c) Both (a) and (b) d) None of these **Answer:** (c) Both (a) and (b)
4. Which reagent is used in the conversion of alcohols to alkyl chlorides? a) SOCl_2 b) NaOH c) KMnO_4 d) H_2SO_4 **Answer:** (a) SOCl_2

Part B: Assertion–Reason Questions

1. **Assertion (A):** Tertiary alkyl halides undergo $\text{S}_{\text{N}}1$ reactions faster than primary alkyl halides. **Reason (R):** Tertiary carbocations are more stable due to hyperconjugation and inductive effects. **Answer:** (a) Both A and R are true, and R is the correct explanation.
2. **Assertion (A):** Haloarenes are less reactive towards nucleophilic substitution than haloalkanes. **Reason (R):** Resonance in haloarenes increases the C–X bond strength. **Answer:** (a) Both A and R are true, and R is the correct explanation.
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Part C: Reasoning Questions (2–3 Marks)

1. **Why is the C–X bond in haloarenes stronger than in haloalkanes?** → Due to resonance stabilization in haloarenes, partial double bond character strengthens the C–X bond.
2. **Explain why benzyl chloride is more reactive than chlorobenzene towards nucleophilic substitution.** → Benzyl carbocation formed is resonance-stabilized, while chlorobenzene resists substitution due to resonance and strong C–Cl bond.
3. **Why does the boiling point of alkyl halides increase with the size of the halogen atom?** → Larger halogen atoms increase van der Waals forces, raising boiling points.

Part D: Conversion Questions (2–3 Marks)

1. Ethanol → Bromoethane *Reagent:* HBr or PBr_3
2. Chlorobenzene → Phenol *Reagent:* NaOH (fused), high temp & pressure
3. Ethyl bromide → Ethene *Reagent:* Alcoholic KOH (elimination)
4. Aniline → Chlorobenzene *Steps:* Diazotization → Sandmeyer reaction
5. Methane → Chloromethane *Reagent:* Cl_2 , UV light (free radical halogenation)

Part E: Case Study Questions (5 Marks)

Case Study 1: Chlorofluorocarbons (CFCs) were widely used as refrigerants and propellants but are now banned due to environmental concerns.

- (i) Explain the role of CFCs in ozone depletion.
- (ii) Suggest eco-friendly alternatives to CFCs.
- (iii) Write one reaction showing the formation of chlorofluorocarbon from methane.

Answer Key: (i) CFCs release Cl radicals in the stratosphere, which catalytically destroy ozone. (ii) Alternatives: Hydrofluorocarbons (HFCs), hydrocarbons, CO₂-based refrigerants. (iii) $\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$ (further fluorination gives CFCs).

Case Study 2: A student performed a reaction of chlorobenzene with NaOH at 623 K and 300 atm pressure.

- (i) Name the product formed.
- (ii) Why are such drastic conditions required?
- (iii) Write the balanced chemical equation.

Answer Key: (i) Phenol (ii) Due to resonance stabilization and strong C–Cl bond in chlorobenzene. (iii) $\text{C}_6\text{H}_5\text{Cl} + \text{NaOH} \rightarrow \text{C}_6\text{H}_5\text{OH} + \text{NaCl}$

✦ This worksheet now mirrors **CBSE exam format**:

- **MCQs & Assertion–Reason** for quick testing
- **Reasoning & Conversions** for 2–3 marks
- **Case Studies** for 5 marks, linking chemistry to environment & industry

Would you like me to also design this as a **student-friendly printable sheet** (with neat boxes, exam tips, and space for answers) so it looks like a ready-to-use handout?

yes

Perfect, Anupa — here's the **final, exam-ready worksheet** for *Haloalkanes and Haloarenes* with **MCQs, Assertion–Reason, Reasoning, Conversions, and 5-mark Case Studies**, plus a **stepwise answer key** so students can self-check.

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✦ This **final worksheet** is now fully exam-oriented:

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Group- B

Physical (3)

8. Solutions
9. Electrochemistry
10. Chemical Kinetics

Organic (5)

11. Haloalkanes and Haloarenes
12. Alcohols, Phenols and Ethers
13. Aldehydes, Ketones and Carboxylic Acids
14. Amines
15. Biomolecules

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