CHEMISTRY YEAR 12 - MODULE 7 - LESSON 8

Hydrocarbon Reactions Mastery — Conditions, Products & Spot the Error

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name _____

Date _____

Class _____

1. Key Ideas

Every mark lost in Module 7 hydrocarbon reaction questions comes down to one of three errors — wrong conditions, wrong product, or wrong reaction type. This lesson fixes all three.

- Reaction conditions for addition, substitution, combustion, and elimination reactions
- How to work backwards from a product to identify the starting material and conditions

2. Success Criteria

By the end, you should be able to:

- Reaction conditions for addition, substitution, combustion, and elimination reactions
- Vicinal dihalides form on adjacent carbons; geminal dihalides form on the same carbon
- Multi-step synthesis requires planning each transformation sequentially

3. Key Terms

Vicinal dihalide
A compound with two halogen atoms on adjacent carbon atoms, formed by addition of halogen to an alkene.

Geminal dihalide
A compound with two halogen atoms on the same carbon atom, formed by two-step hydrohalogenation of an alkyne.

Markovnikov's rule
The principle that in addition of HX to an unsymmetrical alkene, the H attaches to the carbon with more H atoms already attached.

Hydration The addition of water across a double or triple bond, typically requiring acid catalyst (H_2SO_4) and often Hg^{2+} for alkynes.
Hydrogenation
The addition of H_2 across a double or triple bond, requiring a metal catalyst (Ni, Pd, or Pt) and elevated temperature/pressure.

Multi-step synthesis
A sequence of chemical reactions designed to convert a starting material into a target product through planned intermediate steps.

4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

5. Short Answer Questions

1. Explain this lesson goal in your own words: "Reaction conditions for addition, substitution, combustion, and elimination reactions". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "Vicinal dihalides form on adjacent carbons; geminal dihalides form on the same carbon". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Hydrocarbon Reactions Mastery — Conditions, Products & Spot the Error: "Multi-step synthesis requires planning each transformation sequentially".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Hydrocarbon Reactions Mastery — Conditions, Products & Spot the Error but does not use evidence or reasoning.

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

7. Multiple Choice

1. What is the best first step when answering a question about Hydrocarbon Reactions Mastery — Conditions, Products & Spot the Error?

☐ A. Identify the key concept being tested

☐ B. Write every fact from memory

☐ C. Ignore the command word

☐ D. Skip examples and evidence

2. Which answer would show stronger understanding of Hydrocarbon Reactions Mastery — Conditions, Products & Spot the Error?

☐ A. An answer with accurate terms and reasoning

☐ B. A copied definition only

☐ C. A single-word response

☐ D. An answer with no example

3. What should you do if a question asks you to explain?

☐ A. Link the idea to a reason or cause

☐ B. List unrelated facts

☐ C. Only draw a diagram

☐ D. Write the shortest possible answer

8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

SUCCESS CRITERION 1

Prove that you can: Reaction conditions for addition, substitution, combustion, and elimination reactions

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: Vicinal dihalides form on adjacent carbons; geminal dihalides form on the same carbon

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: Multi-step synthesis requires planning each transformation sequentially

BAND 5 4 MARKS

One thing I still need help with: