CHEMISTRY YEAR 11 - MODULE 4 - LESSON 5

Activation Energy, Catalysts & Energy Diagrams

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 car built since the 1970s carries a thin layer of platinum and palladium in its exhaust pipe. Hundreds of thousands of kilometres of toxic gases pass through it — and the platinum is still there, completely unchanged. How can something that is never used up help a reaction happen faster? And if it doesn't alter the products or reactants, what exactly does it change?

- E a = minimum energy for a collision to result in reaction
- Why E a and ΔH are independent quantities (kinetics vs thermodynamics)

2. Success Criteria

By the end, you should be able to:

- E a = minimum energy for a collision to result in reaction
- A catalyst lowers E a — it does NOT change ΔH, reactants, or products
- Homogeneous catalyst: same phase as reactants; heterogeneous: different phase

3. Key Terms

Two common claims about catalysts
A substance that increases reaction rate by providing an alternative pathway with lower activation energy.

ΔH is unchanged
For esterification, ΔH is unchanged by H^+.

Catalyst rule
A substance that increases reaction rate by providing an alternative pathway with lower activation energy.

rate
These are entirely separate questions.

Enthalpy change (ΔH)
The heat energy exchanged at constant pressure during a reaction.

Exothermic
A reaction releasing heat to surroundings (ΔH < 0).

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: "E a = minimum energy for a collision to result in reaction". Use one specific example from the lesson.

BAND 3 2 MARKS

2. Apply this idea to a new example: "A catalyst lowers E a — it does NOT change ΔH, reactants, or products". Show your reasoning clearly.

BAND 4 3 MARKS

3. Analyse why this idea matters for understanding Activation Energy, Catalysts & Energy Diagrams: "Homogeneous catalyst: same phase as reactants; heterogeneous: different phase".

BAND 5 4 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Activation Energy, Catalysts & Energy Diagrams 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 Activation Energy, Catalysts & Energy Diagrams?

☐ 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 Activation Energy, Catalysts & Energy Diagrams?

☐ 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: E a = minimum energy for a collision to result in reaction

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: A catalyst lowers E a — it does NOT change ΔH, reactants, or products

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: Homogeneous catalyst: same phase as reactants; heterogeneous: different phase

BAND 5 4 MARKS

One thing I still need help with: