

Collision Theory Applied to Equilibrium

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

When you squeeze a syringe full of brown NO_2 gas, it gets paler — not because gas escapes, but because the increased collision frequency drives the equilibrium toward the colourless N_2O_4 , and watching that colour change in real time is watching collision theory in action.

- How collision theory explains the approach to equilibrium
- Why decreasing temperature shifts an exothermic reaction to the right using E_a reasoning

2. Success Criteria

By the end, you should be able to:

- How collision theory explains the approach to equilibrium
- The relationship $\Delta H = E_a(\text{forward}) - E_a(\text{reverse})$
- Why a catalyst does not shift equilibrium position or change K_{eq}

3. Key Terms

Dynamic equilibrium

A state where forward and reverse reaction rates are equal.

Equilibrium constant (K_{eq})

The ratio of product to reactant concentrations at equilibrium.

Le Chatelier's Principle

A system at equilibrium shifts to minimise applied disturbances.

Reaction quotient (Q)

The ratio of product to reactant concentrations at any instant.

Closed system

A system where neither matter nor energy can escape to surroundings.

Reversible reaction

A reaction that can proceed in both forward and reverse directions.

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: "How collision theory explains the approach to equilibrium". Use one specific example from the lesson.

BAND 3 **2 MARKS**

2. Apply this idea to a new example: "The relationship $\Delta H = E_a(\text{forward}) - E_a(\text{reverse})$ ". Show your reasoning clearly.

BAND 4 **3 MARKS**

3. Analyse why this idea matters for understanding Collision Theory Applied to Equilibrium: "Why a catalyst does not shift equilibrium position or change K_{eq} ".

BAND 5 **4 MARKS**

6. Extend: Apply the Idea

BAND 5/6

5 MARKS

A student gives a memorised answer about Collision Theory Applied to Equilibrium 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 Collision Theory Applied to Equilibrium?

- 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 Collision Theory Applied to Equilibrium?

- 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: How collision theory explains the approach to equilibrium

BAND 3 **2 MARKS**

SUCCESS CRITERION 2

Prove that you can: The relationship $\Delta H = E_a(\text{forward}) - E_a(\text{reverse})$

BAND 4 **3 MARKS**

SUCCESS CRITERION 3

Prove that you can: Why a catalyst does not shift equilibrium position or change K_{eq}

BAND 5 **4 MARKS**

One thing I still need help with:
