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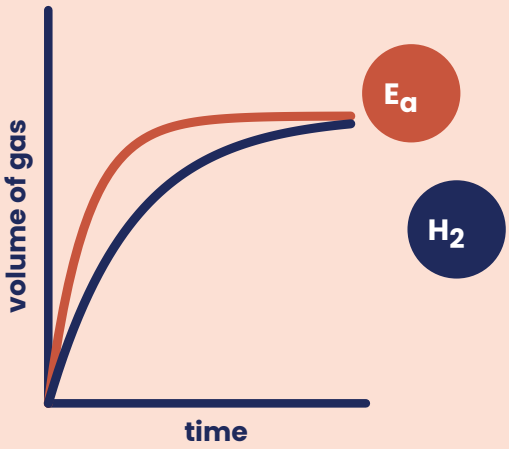
Year 10–11 • GCSE & IGCSE Chemistry

Rates of Reaction

Exam-Style Worksheet

Exam-style questions on collision theory, measuring rate, catalysts, reaction profiles and equilibrium.



Collisions | **Temperature** | **Concentration** | **Surface area** | **Catalysts** | **Equilibrium**

KEY IDEAS IN THIS WORKSHEET **YEAR 10–11**

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Collision theory	**14 marks**
Section B	Measuring rate	**12 marks**
Section C	Catalysts, energy and reversible reactions	**13 marks**

Instructions

- Answer all questions in the spaces provided.
- Show your working in calculations.
- Marks for each question are shown in [ ].
- Use the word and equation boxes to help you.

Total score

/ 39

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Rates of Reaction Worksheet

Year 10–11 • GCSE (AQA 4.6) and Cambridge IGCSE 0620 topic 6 • Exam-style questions. Show your working in calculations.

Section A — Collision theory [14 marks]

Word box

collide | activation energy | frequency | concentration | surface area | catalyst | temperature | pressure

1 Use words from the box to complete the sentences. You may use a word once, more than once or not at all.

(a) A reaction can only happen when particles ..... with enough energy. The minimum energy needed is called the ..... . [2]

(b) Increasing the ..... makes particles move faster, so there are more collisions and more of them have enough energy. [1]

(c) A ..... speeds up a reaction without being used up, by providing a different pathway with a lower activation energy. [1]

2 Use collision theory to explain why increasing the concentration of a solution increases the rate of reaction. [3]

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3 Explain why powdered marble reacts faster with acid than the same mass of marble chips. [3]

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4 Explain why increasing the temperature increases the rate of reaction. Give **two** reasons. [4]

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Section B Measuring rate [12 marks]

5 Give one way to measure the rate of each reaction. **[3]**

Reaction	How to measure the rate
Magnesium + hydrochloric acid (a gas is produced)	
Sodium thiosulfate + hydrochloric acid (cloudy sulfur forms)	
Marble chips + acid in an open flask (gas escapes)	

6 A student reacts 1.0 g of magnesium ribbon with excess hydrochloric acid and measures the volume of hydrogen every 20 seconds.

(a) Sketch the shape of the graph of volume of hydrogen against time. Label where the reaction is fastest. **[3]**

(b) Explain why the reaction slows down. **[2]**

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(c) The student repeats the experiment with 1.0 g of magnesium ribbon and acid of double the concentration. Describe how the graph changes. **[2]**

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(d) 60 cm^3 of hydrogen is produced in the first 40 s. Calculate the mean rate of reaction in this time. **[2]**

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mean rate = ... cm^3/s

Section C — Catalysts, energy and reversible reactions [13 marks]

7 Hydrogen peroxide decomposes slowly: $2H_2O_2 \rightarrow 2H_2O + O_2$. Manganese(IV) oxide speeds up this reaction. Explain how a catalyst works. **[2]**

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8 Give **two** reasons why catalysts are used in industry. **[2]**

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9 Sketch a reaction profile for an exothermic reaction with and without a catalyst. Label the activation energy. **[3]**

10 The reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ is reversible. State what happens to the position of equilibrium if the pressure is increased, and explain why. **[3]**

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11 In the Haber process, explain why a compromise temperature of about 450 °C is used. **[3]**

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END OF WORKSHEET **Total: _____ / 39**