GCSE and IGCSE Chemistry: Rates of Reaction Worksheet

Year 10-11 · GCSE (AQA 4.6) and Cambridge IGCSE 0620 topic 6 · Exam-style questions

Name: ..... **Class:** ..... **Date:** ..... **Score:** / 39

Section A: Collision theory [14 marks]

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 Explain, using collision theory, why increasing the concentration of a solution increases the rate of reaction. **[3]**

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

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

Section B: Measuring rate [12 marks]

5 Name one way to measure the rate for each reaction. **[3]**

Reaction	Measurement
Magnesium + hydrochloric acid (gas 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 with excess acid and measures the volume of hydrogen every 20 s.

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

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

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

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

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

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

8 Give two industrial reasons for using catalysts. **[2]**

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

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

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