

8 Rate of reaction – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
catalyst	_____	_____	_____
collisions	_____	_____	_____
collide	_____	_____	_____
effective collision	_____	_____	_____
non-effective collision	_____	_____	_____
concentration	_____	_____	_____
pressure	_____	_____	_____

Recall

At IGCSE you learned that reactions go faster with higher **concentration**, higher **temperature**, and a **catalyst** . Now we explain *why*, using **collisions** .

- Particles must collide to react.
- But not every collision works.

Nothing here is harder than IGCSE – it just explains the reasons.

New ideas

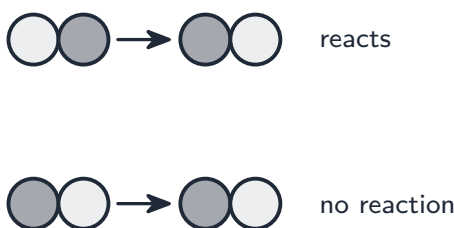
Read these first, then do the Practice.

■ 1 Collisions

To react, particles must **collide** . Only some collisions cause a reaction:

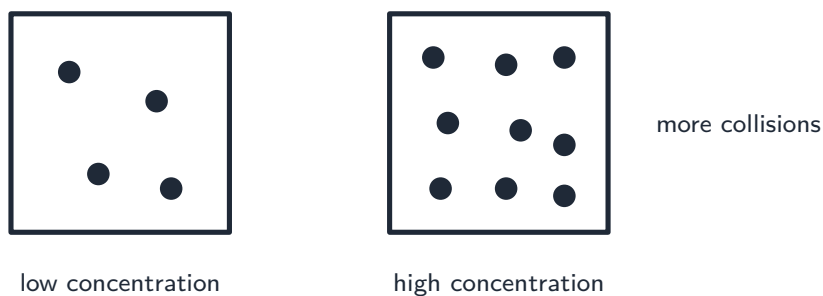
- an **effective collision** has **enough energy** *and* the **correct orientation** (direction).
- a **non-effective collision** has too little energy, or the wrong angle – nothing happens.

So the rate depends on the **frequency of effective collisions** (how many useful collisions happen each second).



■ 2 Concentration and pressure

Increasing the **concentration** of a solution (or the **pressure** of a gas) packs the particles closer. They collide **more often**, so there are more effective collisions each second – the rate rises.



Watch out: a faster rate needs more *effective* collisions per second. Simply colliding is not enough – the collision must also have enough energy *and* the correct orientation.

Practice

Try these in order.

8.1 What is meant by the *rate of reaction*?

[1]

8.2 State the two things a collision needs to be *effective*. [2]

8.3 Explain why increasing the concentration of a reactant increases the rate. [2]

8.4 A reaction makes 48 cm^3 of gas in 24 s. Calculate the mean rate in $\text{cm}^3 \text{ s}^{-1}$. [2]

8.5 Increasing the pressure of a gas reaction speeds it up. Explain why, in terms of collisions. [2]

8.6 Challenge. Powdered marble reacts with acid much faster than the same mass of large marble chips. Explain why, in terms of collisions. [2]
