

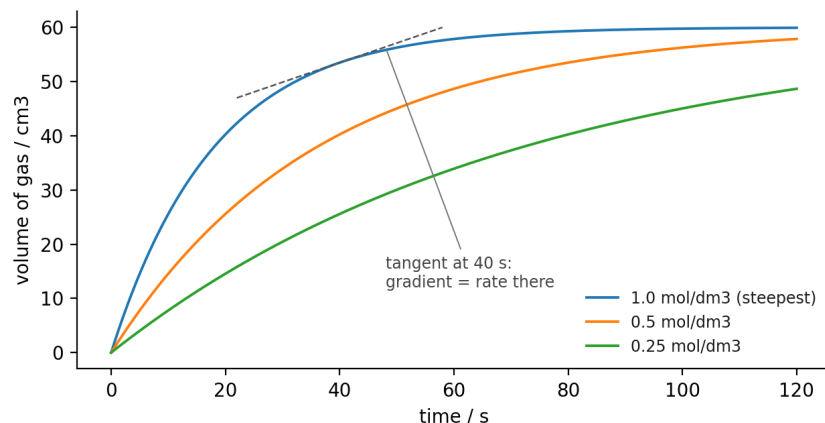
Exercise walk-through

6.1

Rate of reaction (4.6.1.1–4.6.1.5)

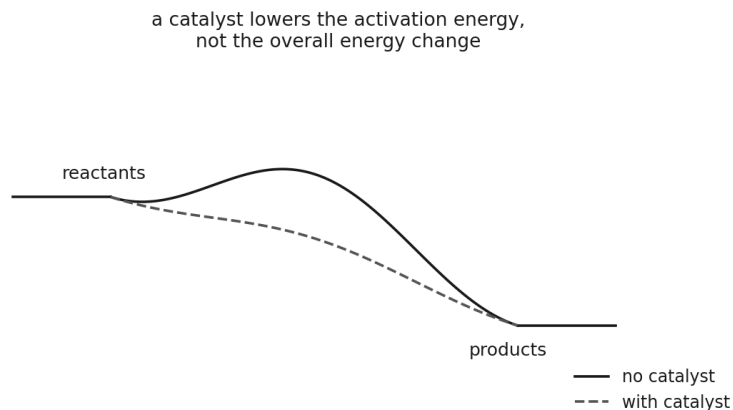
AQA · GCSE · Chemistry

Measuring rates



- Rate = quantity used or formed, over time.
- Units — g/s, cm³/s; higher tier mol/s.
- Steeper graph, faster reaction; tangent gradient = instantaneous rate.

Catalysts



- Not used up; not in the equation; reaction-specific.
- A different pathway with lower activation energy.
- Enzymes catalyse biological systems.

Exercises 2.1·2.3

2.1 0.48 g of magnesium disappears in 60 s. Give the mean rate in g/s. [2]

2.2 Why does powdered marble react faster than the same mass as one lump? [2]

2.3 What does a catalyst change on a reaction profile? [1]

Exercises 2.1·2.3

2.1 0.48 g of magnesium disappears in 60 s. Give the mean rate in g/s. [2]

2.1 $0.48 \div 60 = 0.008 \text{ g/s}$.

2.2 Why does powdered marble react faster than the same mass as one lump? [2]

2.2 Powder has a larger surface-area-to-volume ratio; more particles are exposed to the acid, so collisions are more frequent.

2.3 What does a catalyst change on a reaction profile? [1]

2.3 It lowers the activation energy – a lower hump; the overall energy change is unchanged.

Exercises 3.1·3.3

3.1 Explain, using collision theory, why a reaction mixture kept at 60 °C reacts faster than the same mixture at 20 °C. [4]

3.2 In RP5, sodium thiosulfate and acid turn cloudy. Describe how this reaction can measure rate, and give two control variables. [4]

3.3 (*HT*) Sketch a product–time graph and explain how to find the rate at 30 s. [3]

Exercises 3.1·3.3

3.1 Explain, using collision theory, why a reaction mixture kept at 60 °C reacts faster than the same mixture at 20 °C. [4]

3.1 At 60 °C particles have more kinetic energy; they collide more frequently; and a greater proportion of collisions exceeds the activation energy; both effects raise the successful-collision rate, so the reaction is faster.

3.2 In RP5, sodium thiosulfate and acid turn cloudy. Describe how this reaction can measure rate, and give two control variables. [4]

3.2 Time how long a cross beneath the flask takes to disappear – the cloudier it gets, the faster the reaction. Controls: same concentration/volume of both solutions; same temperature/flask, same observer distance and lighting.

3.3 (*HT*) Sketch a product–time graph and explain how to find the rate at 30 s. [3]

3.3 Curve rising steeply then flattening to a plateau; draw a tangent touching the curve at 30 s; the gradient of the tangent = change in quantity ÷ change in time along it, giving the rate at 30 s.