6 Rate of reaction – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	**Write it 3 times** (English)		
rates			
chemical change			
physical change			
collide			
activation energy			
rate			
concentration			
surface area			
temperature			
catalyst			

Recall

Some changes make a **new substance**; others just change shape or state. And reactions can go at different **rates** .

- A **chemical change** makes a new substance (e.g. burning, rusting).
- A **physical change** does not (e.g. melting, dissolving).

Nothing here is hard – it just adds the collision idea.

New ideas

Read these first, then do the Practice.

1 Physical vs chemical change

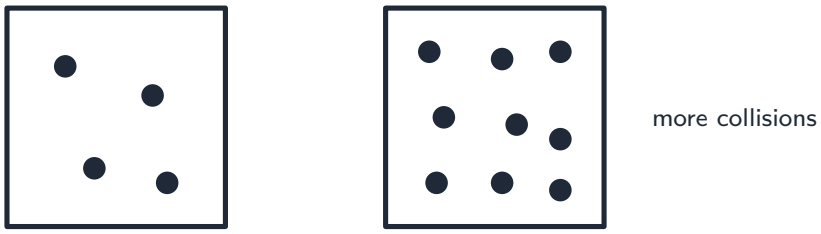
Physical change	Chemical change
no new substance	new substance(s) made
easy to reverse	usually hard to reverse
e.g. melting, dissolving	e.g. burning, rusting

2 Collision theory

For a reaction, particles must **collide** with enough energy (the **activation energy**). A faster **rate** means more successful collisions each second.

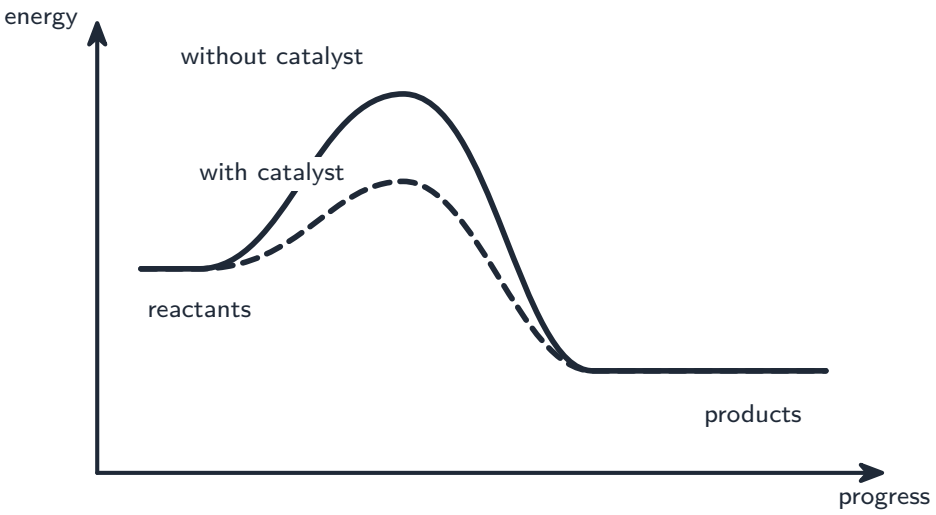
These all make a reaction **faster**:

Change	Why (collisions)
higher **concentration**	more particles in a volume → collide more often
larger **surface area** (a powder)	more particles exposed → collide more often
higher **temperature**	particles move faster → collide more often, with more energy
a **catalyst**	lowers the activation energy



3 Catalysts

A **catalyst** speeds up a reaction but is **not used up**. It lowers the **activation energy**, so more collisions succeed (it does **not** change ΔH).



Watch out: a catalyst speeds a reaction by **lowering the activation energy**, but it is **not used up** and does **not** change ΔH. Higher concentration, smaller pieces and higher temperature all work by giving **more successful collisions per second**.

Practice

Try these in order.

6.1 State two differences between a physical and a chemical change. [2]

6.2 What two things must particles do to react (collision theory)? [2]

6.3 Explain why a powdered solid reacts faster than a single lump. [2]

6.4 Explain why raising the temperature speeds up a reaction. [2]

6.5 Does a catalyst get used up in a reaction? [1]

6.6 Challenge. Marble chips react with acid. State **two** changes that would make the reaction faster, and explain each one using collision theory. [4]