

# Section 2 Summary

## 2.1 Chemical Reactions

a) All chemical reactions form at least one new substance.

- If a new substance is not formed then there has been no chemical reaction
- There can be more than one new substance formed as long as **one** new substance has been formed at the end then there has been a chemical reaction.

b) Signs of a chemical reaction include:

- a **change in colour** or appearance
- a **gas given off**
- a **solid** (precipitate) **being formed**
- an energy change e.g. **heat given off**

All of these changes indicate a new chemical has been produced

c) **Physical changes** are processes which change the appearance of substances but no new chemical is formed.

- Melting
- boiling/evaporation
- freezing
- condensation
- dissolving
- separation
- other changes not involving a chemical change like breaking etc.

d) There are many **everyday chemical reactions**:

Reaction Indicator	Everyday Example
Colour change	toast burning, cooking sausages
Gas given off	alkaseltzer tablet in water, making bread
Solid formed	boiling an egg
Heat given off	burning petrol, burning coal

## 2.2 Speed of Reactions

a) **Chemical reactions** can be speeded up or slowed down depending on the conditions during an experiment.

b) **Changing the Temperature**

Increasing the temperature	speeds up a reaction.
Decreasing the temperature	slows down a reaction.

c) **Changing the Particle Size**

Decreasing the particle size	(particle size means size of lumps) speeds up a reaction.
Increasing the particle size	slows down a reaction.

d) **Changing the Concentration**

Increasing the concentration	speeds up a chemical reaction.
Decreasing the concentration	slows down a chemical reaction.

e) There are many **everyday examples** of changing reaction speeds:

1. **Changing Temperature**

Higher temperature to speed up cooking.  
Cold temperature in fridge to slow down food rotting.  
Hot weather allows plants to grow quicker.

2. **Changing Particle Size (size of lumps)**

Powdered medicines instead of lumps (tablets) to speed up how quickly they get to work in the body.  
Big lumps of coal burn slower than small lumps of coal to save money.

3. **Changing Concentration**

Doubling the number of tablets of headache tablets like paracetamol increases the concentration of medicine and has a more powerful effect on the headache.

Diluting bleach kills less germs than bleach from the bottle  
(concentration is measured in mol/l or moles per litre)

## 2.2 Speed of Reactions (cont.)

f) Adding a **catalyst speeds up a chemical reaction.**

g) A **catalyst speeds up a chemical reaction but is not used up in the reaction.**

- The same weight of catalyst can be recovered at the end the reaction.

h) There are many examples of catalysts in action in the world.

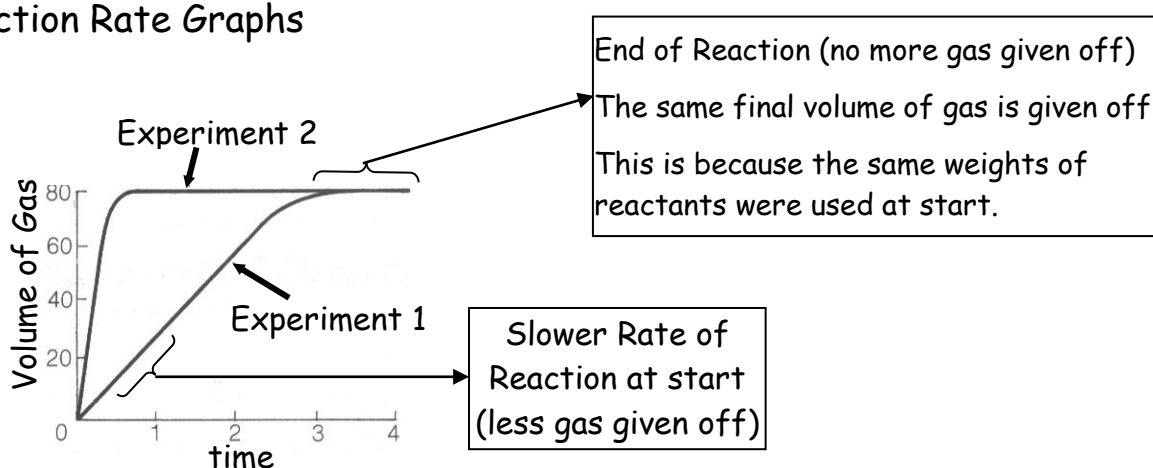
- A car contains a **catalytic converter** to speed up turning harmful gases back to cleaner gases.
- Contact lens solutions contain a catalyst to speed up turning the cleaning (bleaching) agent back to harmless chemicals.

i) **Enzymes are biological catalysts** which speed up reactions in living things.

j) There are many examples of enzymes at work in the everyday world.

- Vegetables contain the enzyme **catalase** which speeds up the rate at which peroxide breaks down.
- Yeast used the enzyme **zymase** to break sugar down into alcohol.

k) Reaction Rate Graphs



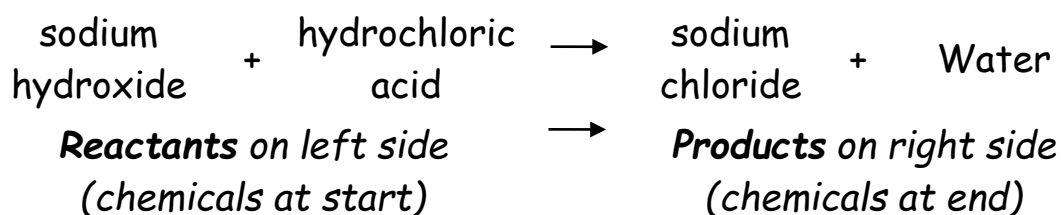
Differences Between Experiments 1 and 2	
<u>Possible Experiment 2 Conditions</u>	<u>Possible Experiment 1 Conditions</u>
Higher Temperature used	Lower Temperature used
Higher Concentration used	Lower Concentration used
Smaller Particle Size used	Larger Particle Size used
Catalyst added	No Catalyst added

## Section 2 Summary

### 2.3 Word Equations

- a) **Word equations** tell scientists what is going on in a chemical reaction.
- b) All the chemicals present at the start are called **Reactants**.
- Reactants are listed on the **Left** hand side of an equations.
- c) All the chemicals which are formed during a chemical reaction are called **Products**.
- Products are listed on the **Right** hand side of an equation.

e.g.



(Try to write word equations in one line rather than over two lines)

- d) You should be able to turn a written passage into a word equation.
- e.g. carbon dioxide gas is produced when sodium carbonate reacts with hydrochloric acid. Water and sodium chloride are also produced.

