CHEMICAL REACTIONS SUMMARY NOTES

In all chemical reactions a new substance is made

Chemical reactions can be identified by:

1. changes in colour
2. a gas being produced
3. a solid (Precipitate) being produced from clear solutions
4. heat given out or taken in

Examples of everyday chemical reaction

1.When a firework is lit, there is an explosion.
2.When milk is left out of the fridge it turns sour.
3.When bread is toasted.
4.When an egg is cooked.
5. Baking a cake.

Differences between a chemical change and a physical change:

During physical changes new substances are **NOT** produced whereas in a chemical change a new substance is made.

Substances produced from a physical change are **easily changed back** to the original substance.

Ice melting is an example of a physical change

The following increase the reaction rate

1. Decrease in particle size
2. Increase in temperature
3. Increase in concentration
4. Presence of a catalyst

LEVEL 5

Collision theory:

In order for a reaction to occur, reactant particles must

1. ***collide and***
2. ***collide with enough energy***

Explaining changes in reaction rate using collision theory

A decrease in reactant **particle size** increases the surface area this leads to an increased FREQUENCY of collisions which leads to an increase in reaction rate

An increase in reactant **concentration** leads to an increased FREQUENCY of collisions which leads to an increase in reaction rate

An increase in reactant **temperature** leads to an increased FREQUENCY of collisions AND an increase in the ENERGY of the collisions which leads to an increase in reaction rate

Catalysts

Catalysts are substances that can be used to increase the rate of a reaction. Catalysts provide an "easy route" from reactants to products but they are not used up during the course of a reaction and can be recovered unchanged at the end of the reaction. The mass of catalyst at the end of a reaction will therefore be the same as that at the start of the reaction.

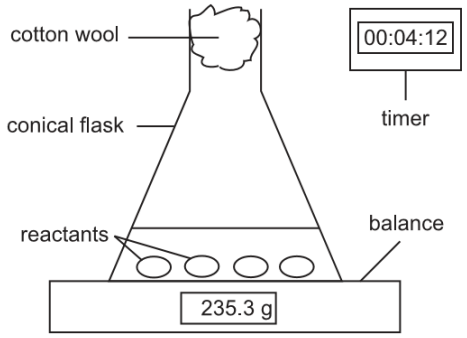
Example of a catalyst

Catalysts are used in a car exhaust systems to convert harmful gases into harmless gases

Methods of collecting data from a chemical reaction

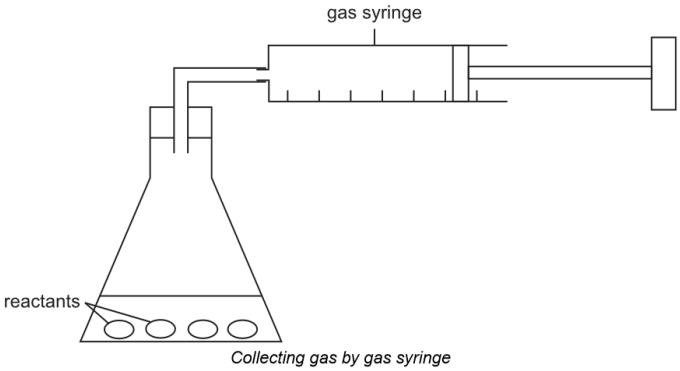
LEVEL 5

Monitoring Mass Changes



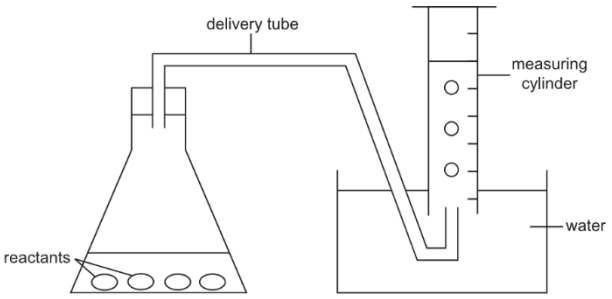
Measuring mass loss in a reaction

Monitoring Volume Changes
Water SOLUBLE gas



Collecting gas by gas syringe

Monitoring Volume Changes
Water INSOLUBLE gas

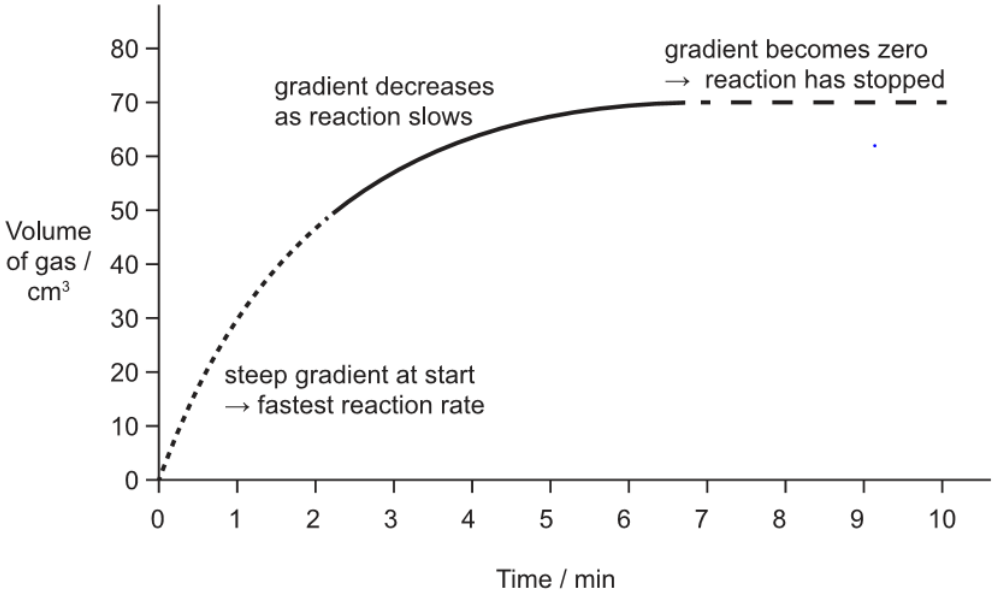


Interpreting Graphs

LEVEL 5

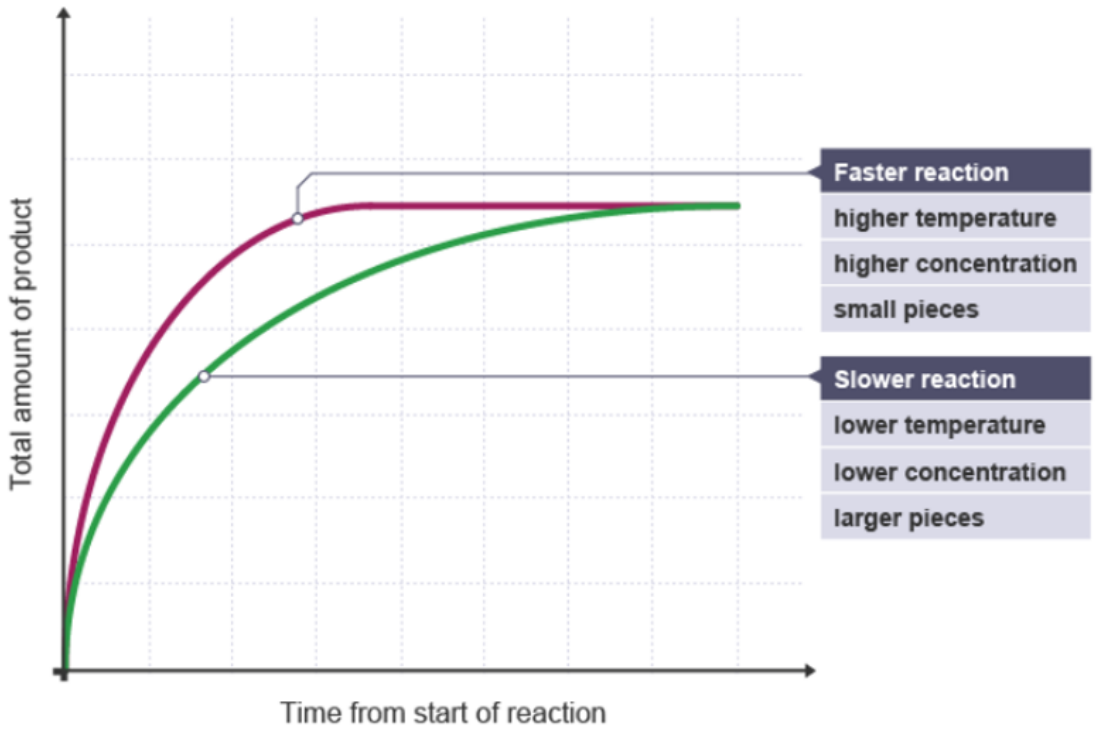
The gradient (steepness) of a graph tells about the rate of a chemical reaction.

The steeper the gradient, the faster the rate of reaction.



Generally, the rate of reaction will slow as it progresses since the reactants are being used up.

We can see that the gradient of the rate graph starts steepest (fastest rate), then slows down (rate is decreasing) before becoming straight (reaction is finished).



AVERAGE RATE of a reaction can be calculated using the formula

$$\text{Average Rate} = \frac{\textbf{\textit{Change in quantity}}}{\textbf{\textit{Change in time}}}$$

Example involving a change in volume

The average rate of reaction over the first 10s is

$$\text{Rate} = \frac{\Delta \text{ quantity}}{\Delta \text{ time}} = \frac{25 - 0}{10}$$

$$= \mathbf{2.5\ cm^3\ s^{-1}}$$