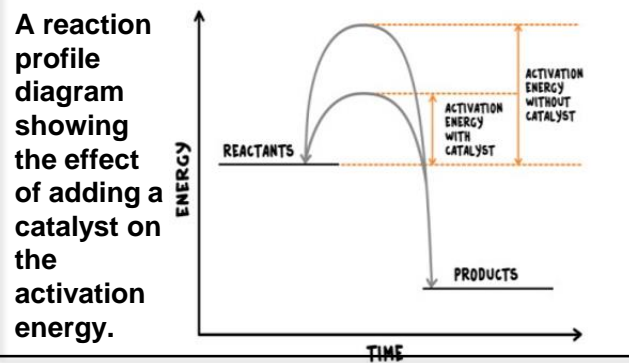


**AQA C6 RATE OF REACTION
COMBINED FOUNDATION
RPs: Disappearing cross & gas collection**

Key Word	Definition
concentration	The amount of dissolved solid (solute) in a volume of solution. A high concentration means there is a lot of solute in solution.
pressure	This is caused when lots of gas particles hit the surface of a container. When particles become closer together, the pressure increases.
surface area	A measure of the total area around a substance. By powdering a solid, the surface area increases.
catalyst	A substance that speeds up the rate of a reaction, but is unchanged.
enzyme	These are biological catalysts.
activation energy	The minimum amount of energy colliding particles need for a reaction to take place.
reactant	A chemical that is used up in a chemical reaction.
product	A chemical that is made in a chemical reaction.
successful collision	A collision between particles that results in a chemical reaction.



HOW CATALYSTS WORK

Catalysts and enzymes speed up reactions.

Catalysts provide a different reaction pathway where reactants do not require as much energy to react when they collide.

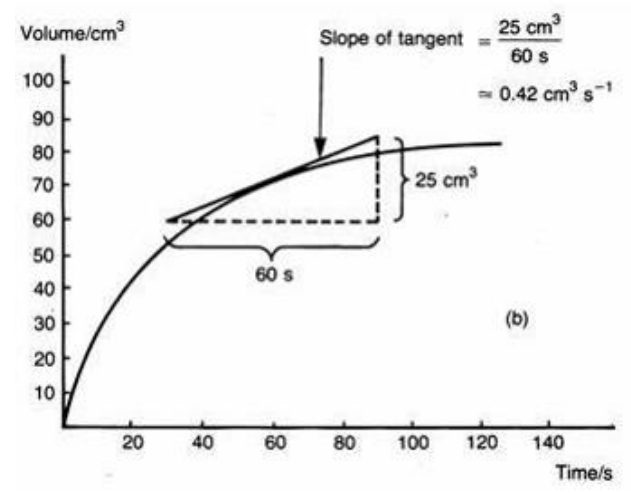
Catalysts do not appear in word equations as they remain unchanged.

CALCULATING THE RATE OF A REACTION

The rate of a reaction can be calculated from either the amount of product made in a reaction or the amount of reactant used up in a reaction. The equations are;

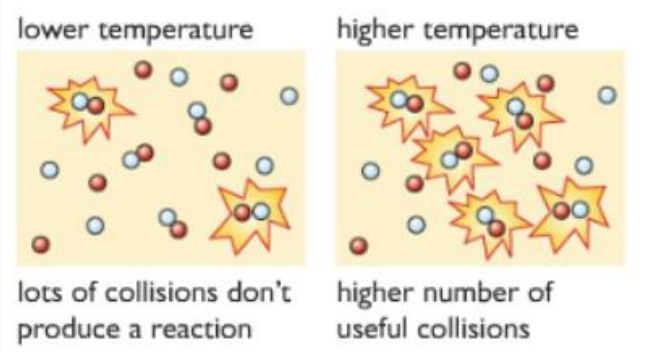
$$\text{rate} = \frac{\text{amount of reactant used}}{\text{time}} \quad \text{rate} = \frac{\text{amount of product made}}{\text{time}}$$

You can also calculate it by drawing a tangent from a graph:



EQUILIBRIUM IN REVERSIBLE REACTIONS

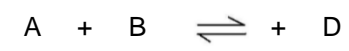
When a reversible reaction occurs in apparatus which prevents the escape of reactants and products, equilibrium is reached when the forward and reverse reactions occur exactly at the same rate.



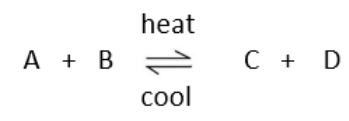
REVERSIBLE REACTIONS

A reversible reaction occurs in some chemical reactions. This is when the products can react again to re-form the reactants.

In a reaction we use a double arrow to represent that is a reversible reaction:

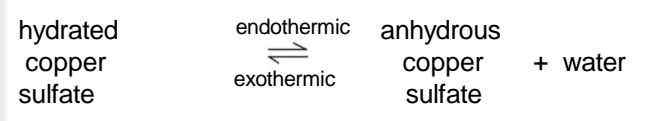


The direction of reversible reactions can be changed by changing conditions:



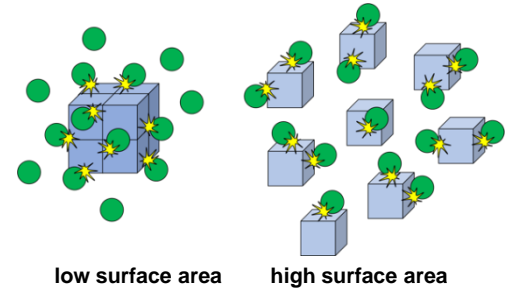
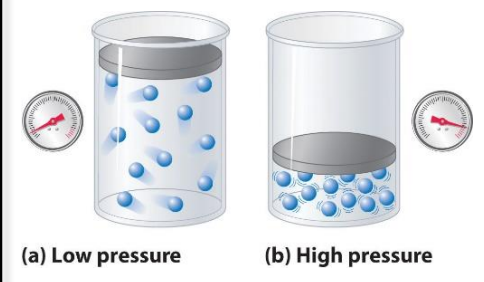
Looking at the reaction above, to make C and D, we can apply heat. If we want to make A and B, we can cool the reaction mixture.

If one direction of a reversible reaction is exothermic, the opposite direction is endothermic. The same amount of energy is transferred in each case. For example:



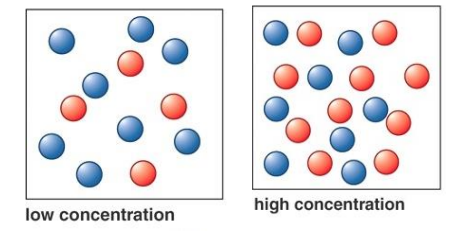
UNITS IN CALCULATING RATE

Quantity	Unit
mass	grams (g)
volume	centimetres cubed (cm ³)
rate	grams per second (g/s) cm ³ per second (cm ³ /s)



THE FACTORS THAT EFFECT THE RATE OF A REACTION

- Temperature:** The higher the temperature the faster the reaction rate.
- Concentration:** The higher the concentration of a solution the faster the reaction rate.
- Surface Area:** The larger the surface area of a solid reactant, the faster the reaction rate.
- Pressure:** The higher the pressure of a gas, the faster the reaction rate.



EXPLAINING CHANGE IN RATE USING COLLISION THEORY

What is collision theory?
Chemical reactions can only occur when reacting particles collide with each other with sufficient energy.

Explaining the change in the rate of a reaction.
Increasing the temperature increases the frequency of collisions and makes the collisions more energetic, therefore increasing the rate of reaction.

Increasing the concentration, pressure (gases) and surface area (solids) of reactions increases the frequency of collisions, therefore increasing the rate of reaction.

