

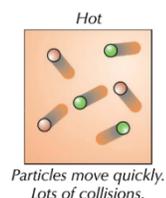
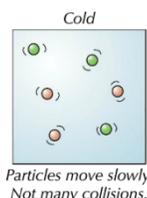
Chemistry Crib Sheet: Topic 6

Rate of reaction – how quickly reactants are turned into products

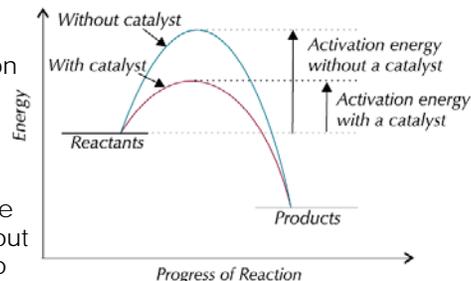
Collision theory – the rate of reaction depends on:

1. Frequency of collisions between reacting particles
2. Energy transferred during collision. Activation energy – the minimum energy that particles must have to successfully collide

Factors affecting rate of reaction



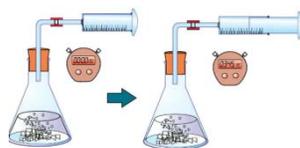
- Temperature
- Concentration (pressure in gases)
- Surface area
- Catalyst (speeds up the reaction without being used up or changed)



Measuring the rate of reaction

$$\text{Mean rate of reaction} = \frac{\text{Quantity of reactant used or product formed}}{\text{Time}}$$

Measure the volume of gas produced. Eg magnesium metal & dilute hydrochloric acid



Measure the formation of product. Eg sodium thiosulfate & hydrochloric acid

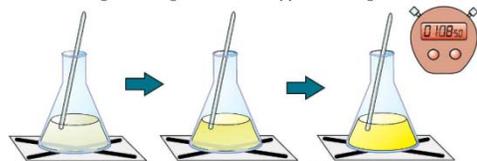
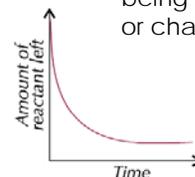
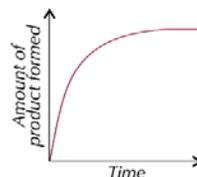
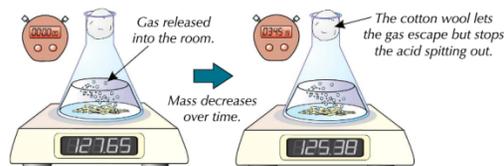


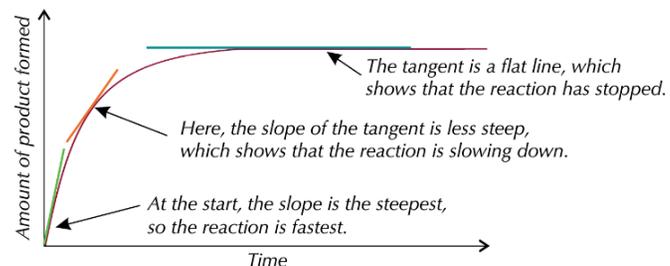
Figure 2: Investigating the rate of the reaction between sodium thiosulfate and hydrochloric acid.

Measure the change in mass



$$\text{Rate of reaction} = \frac{\text{change in } y}{\text{change in } x}$$

By drawing tangents at various points along the curve of a reaction, you can see how the rate changes over time.

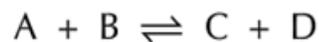


Units of rate of reaction:

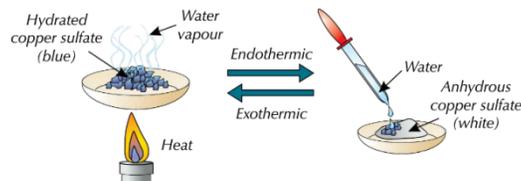
unit of amount of substance/unit of time

Eg g/s cm³/min

Reversible reactions – the products can react to produce the original reactants. If it is exothermic in one direction, it will be endothermic in the other direction (no overall energy change)



Equilibrium – when the amounts of reactants and products reach a balance. This only happens in a 'closed system' (nothing can escape or get in)



Le Chatelier's principle – if you change the conditions of a reversible reaction at equilibrium, the system will try to counteract the change. The yield can be altered to end up with more of the desired product.

Temperature	Raise the temperature to increase yield of endothermic reaction. Reduce the temperature to increase the yield of the exothermic reaction
Pressure	Raise the pressure to increase the yield of the reaction which produces less volume. Lower the pressure to increase the yield of reaction which produces more volume
Concentration	Increase concentration of a reactant to increase the yield of the product.