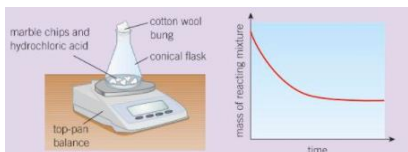


Pure substances and mixtures

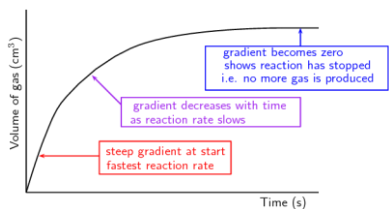
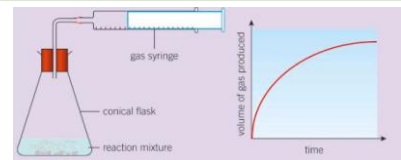
To measure the rate of a reaction you can:

- Measure how fast the reactants are used up
- Measure how fast the products are made

e.g. Measure mass lost due to gas formed



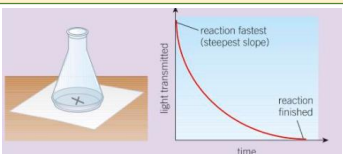
e.g. Measure volume of gas made



Rate = volume of gas ÷ time

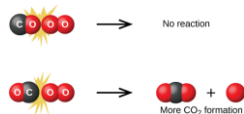
cm³/s

e.g. Measure time for insoluble product to form



C12 Chemical Analysis

Chromatography



A successful collision is one that leads to a reaction

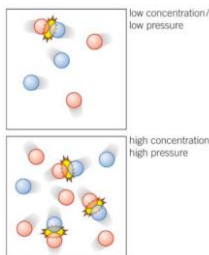
So to increase the rate of a reaction you must either

- Increase the frequency of collisions
- Increase the energy of the collisions
- Decrease the energy needed for a collision to be successful

Gas tests

Concentration and Pressure

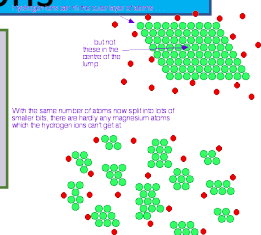
More particles in the same space.
More frequent collisions



TRIPLE ONLY

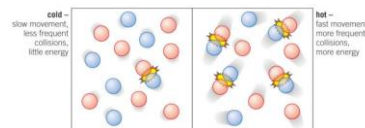
Tests for Positive ions

More particles available to react.
More frequent collisions



Temperature

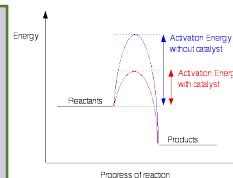
Particles **move faster**.
So they **collide more frequently**.
Particles collide **with more energy**.
So more of the collisions are **successful**.



Tests for Negative ions

Catalysts

Lower the energy needed for successful collisions. (Activation energy)
Not used up.
Biological catalysts are called **enzymes**

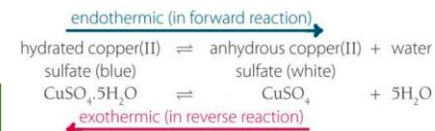


Instrumental Analysis

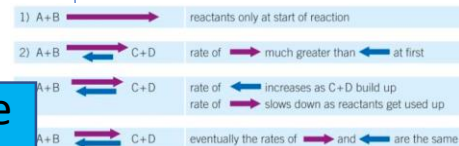
Can go in both directions.



If a reaction is exothermic in one direction it is endothermic in the other direction.



In a closed system (where nothing can get in or out) an **equilibrium** is reached where the **rate of reaction is the same in both directions**.



At equilibrium:

- Rate of forward reaction = rate of reverse reaction.
- Amount of products and reactants don't change.

