

Rates of Reactions

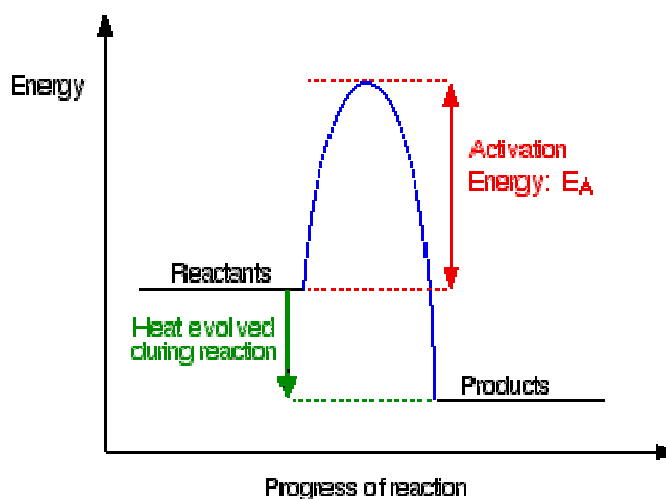
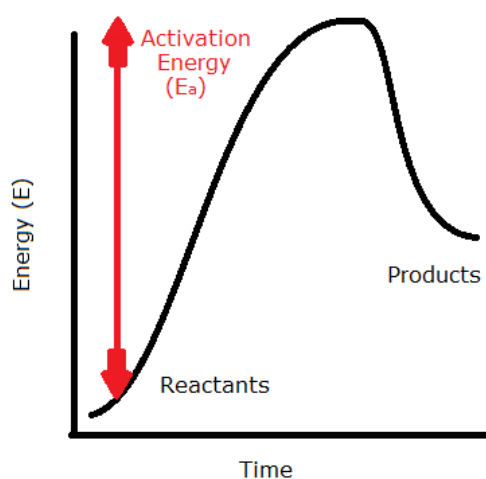
The rate of reaction is how fast a reaction happens

- We can measure this by: the mass of a mixture, the volume of gas given off, measure the light transmitted.
- Important in chemical industry – must make as much of a product as possible as cheaply as possible therefore need to be made quickly and safely.

$$\text{Rate of reaction} = \frac{\text{amount of a reactant used or amount of product formed}}{\text{Time}}$$

Collision Theory

- Affected by the temperature, concentration, surface area, pressure and whether there is a catalyst.
- Reacting particles don't just bump into each other. They must collide with enough energy otherwise they will not react.
- Activation energy – minimum energy needed for a chemical reaction to take place.



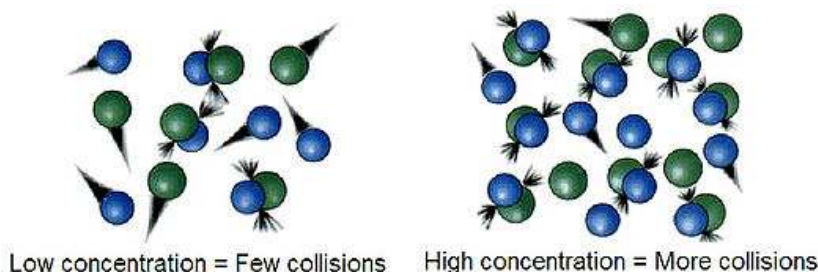
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Concentration

Higher concentration = more collisions

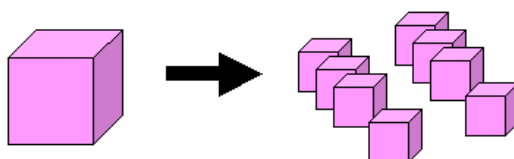
Dissolved particles are closer together therefore more collisions happen in an area of solution.

Remember: increasing concentration or pressure does not increase the energy with which the particles collide. It does increase the frequency of the collisions, however.



Surface Area

Smaller pieces of materials have an increased surface area for a reaction to take place – so quicker reaction time.



Temperature

At higher temperatures particles collide more often, which means that the energy transferred increases as the particles move faster, moving faster means more collisions.

At higher temperatures particles collide with more energy, and more energy means more energetic collisions. An increase of 10°C roughly doubles the rate of a reaction.