Rates of Reaction

What causes an increased rate of reaction?
A higher freqeuncey of successful collisions between particles.

There are two ways you can achieve a higher frequency of successful collisions.

- Increase chances of collisions being successful
- Or increase frequency of collisions per unit time

Rates of Reaction

Increasing the surface area increases the frequency of collisions per time unit because more particles are available to react

Increasing the concentration increases the number of particles, which increases the frequency of collisions per time unit

Increasing the temperature increases the amount of kinetic energy the particles have. This: (1) causes the particles to move quicker and therefore increases the frequency of collisions and (2) more of the collisions are successful because the particles have more energy. This leads to a faster rate of reaction.

Catalysts lower the activation energy (energy needed) and so, therefore, more of the collisions are successful as the required energy for a successful collision is less.

Why does a rate of reaction graph go flat as the reaction progresses?

As the reactant particles react and are converted into products, the concentration of reactants decreases and therefore the rate of reaction decreases until it becomes zero, hence why the graph goes flat.

Atoms and Ions

Why do atoms form ions?

Because they have a partially filled valence (outer) shell and are unstable as a result. They need to gain or lose negative electrons in order to have a completely full, or empty their, outermost shell, and by doing so become stable.

Ionic Bonding

This is when atoms with too many valence electrons donate these electrons to atoms with too little valence electrons. This transfer of electrons causes ions to form and the *electrostatic* attraction between the oppositely charged ions is called an ionic bond. Sometimes you need more than one ion of the same type in order to make an ionic compound with a *neutral* charge.

Atoms in the same **group** (vertical column) of the periodic table will have the same number of valence electrons and therefore have the same charge.

Atoms in the same **period** (horizontal row) have the same number of shells/orbitals.

Neutralisation Reactions

Acid + base = water + neutral ionic salt (e.g. MgCl2)

Acid + carbonate base (e.g. Na2CO3) water + neutral ionic salt (e.g. MgCl2) + **CO2** (to account for the carbonate in the base)

If you see fizzing, then you know you have CO2 in there.

You only need to know the symbols of three acids: Hydrochloric acid, HCl − Sulfuric acid, H2SO4 − And nitric acid, HNO3

Acids and Bases

An **acid** produces H+ ions in water. A **base** produces OH- ions in water.

The higher the concentration of H+ ions, the lower the pH (1-6, red-yellow in UI), the more acidic the solution is.

The higher the concentration of OH- ions, the higher the pH (8-14, light blue-purple in UI), the more basic the solution is.

If the pH is 7, there is an equal amount of H+ ions and OH- ions so it is balanced/-neutral and is a water.

Acids turn blue litmus paper red, and don't change the colour of red litmus paper. Bases turn red litmus paper blue, and don't change the colour of blue litmus paper.

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