

REALLY, REALLY LAST MINUTE STUFF

Atoms and ions

ATOMIC NUMBER = # of protons (also the # of electrons in an atom). MASS NUMBER = # of protons PLUS # of neutrons in nucleus of atom.

PROTONS are positive, NEUTRONS are neutral. ELECTRONS are negative. Atoms are neutral overall as # of protons = # of electrons.

Ions are charged particles.... formed when atoms lose or gain electron(s).... to achieve a full valence shell... which is a stable arrangement.

Metal atoms LOSE electron(s) to form +vely charged ions. E.g. Na 2, 8, 1 will lose one electron becoming Na^+ electron arrangement 2, 8

Non-metal atoms GAIN electron(s) to form -vely charged ions. E.g. S 2, 8, 6 will gain two electrons becoming S^{2-} electron arrangement 2, 8, 8

Most of the mass of an atom is due to protons and neutrons found in the nucleus of the atom. Electrons arranged in energy levels (can hold 2, 8, 8...)

Use the table of ions to write chemical formulae: Use brackets if you use NH_4^+ , OH^- , NO_3^- , HCO_3^- , SO_4^{2-} or CO_3^{2-} more than once e.g. NaOH BUT

$\text{Cu}(\text{OH})_2$

Attraction between oppositely charged ions is an ionic bond. Compounds made from oppositely charged ions e.g. NaCl , are called ionic compounds.

The sum of the +ve and -ve charges in an ionic compound adds up to zero e.g. Al_2O_3 as $(2 \times 3+) + (3 \times 2-) = 0$

Acids and Bases

Acid pH 0-6, neutral pH = 7, alkali pH 8-14

- Substance is acidic if $[\text{H}_3\text{O}^+] > [\text{OH}^-]$ [...] means concentration.
- Substance is neutral if $[\text{H}_3\text{O}^+] = [\text{OH}^-]$
- Substance is alkaline if $[\text{H}_3\text{O}^+] < [\text{OH}^-]$

UI colours (acid) red...orange...yellow...green(neutral)...green-blue...blue...purple (alkaline)

Litmus colours: Red in acid, blue in alkali. In a neutral solution red stays red and blue stays blue!

General equations you MUST know

- metal + acid \rightarrow salt + hydrogen (test for H_2 lit splint: gas burns with pop)
- base + acid \rightarrow salt + water (base is a metal oxide or metal hydroxide)
- carbonate (also hydrogen carbonate) + acid \rightarrow salt + water + carbon dioxide (test for CO_2 : gas turns clear limewater milky/cloudy)

Acids to memorise: sulfuric H_2SO_4 , nitric HNO_3 , hydrochloric HCl

Bases to memorise: sodium hydroxide NaOH , ammonia NH_3 , sodium hydrogen carbonate NaHCO_3

To make a salt – heat excess metal (but not Cu) or base or carbonate with the acid.

Filter off excess (unreacted) metal or base or carbonate. Slowly evaporate the salt solution to get crystals (or leave solution in a warm place to let water evaporate).

Rates

Rates is about how many collisions/time... yes ... COLLISIONS PER TIME!!!!

An increase in rate means more collisions/time e.g more collisions/second and NOT just more collisions!!

Rate is increased by

- increasing concentration (of a solution) (If a solution is more concentrated it contains more particles/mL and so there will be more collisions/s...so increase in rate).
- increasing surface area (of a solid) (If a solid is chopped up it has more particles immediately exposed and so there will be more collisions/s...so increase in rate).
- increasing temperature (Increased temperature means particles move faster so more collisions/s PLUS particles have greater energy (E_k) so more of the collisions/s are effective/successful collisions. Do NOT talk about more FORCEFUL collisions...they are more ENERGETIC!
- adding a catalyst (speeds up a reaction without being used up).