AQA GCSE Chemistry

Topic 4: Chemical changes

Reactivity of metals

Notes

(Content in bold is for Higher Tier only)

Metal oxides

- Metals + oxygen -> metal oxides
- Known as oxidation reactions because the metals gain oxygen
- Reduction= loss of oxygen & oxidation= gain of oxygen

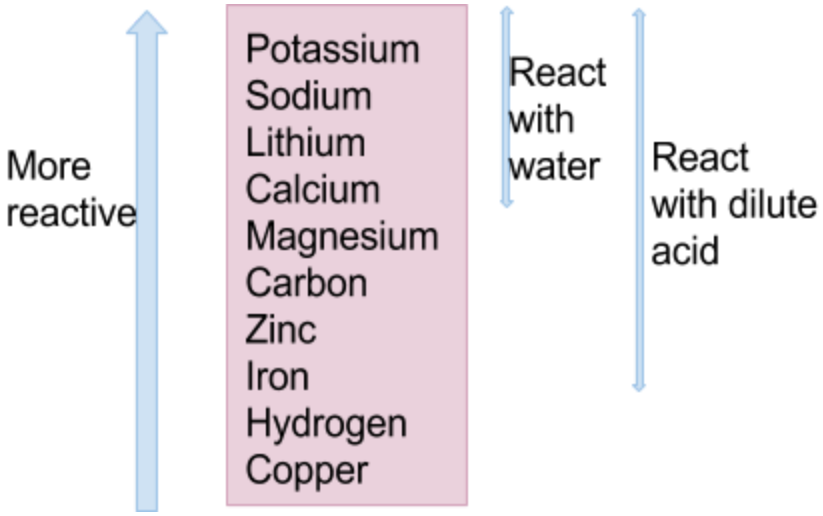
The reactivity series

- When metals react with other substances, metal atoms form positive ions
- Reactivity of a metal is related to its tendency to form positive ions
- Metals can be arranged in order of their reactivity in a reactivity series
    - Metals potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper can be put in order of their reactivity from their reactions with water and dilute acids:

element	reaction with water
potassium	violent
sodium	very quick
lithium	quick
calcium	more slow

element	reaction with dilute acid
calcium	very quick
magnesium	quick
zinc	fairly slow
iron	more slow
copper	very slow

    - Non-metals hydrogen and carbon are often included in the reactivity series
- A more reactive metal can displace a less reactive metals from a compound (think about how this is similar as well to halogens)



Extraction of metals and reduction

- Gold, since it is very unreactive, it is found in the Earth as the metal itself
- But, most metals are found as compounds that require chemical reactions to extract the metal
- Metals less reactive than carbon can be extracted from their oxides by reduction with carbon
    - Don't forget: reduction involves the loss of oxygen

Oxidation and reduction in terms of electrons

- **Try and remember this phrase: OIL RIG, it stands for Oxidation Is Loss and Reduction Is Gain (of electrons)**
- **to write ionic equations:**
    - **if sodium is oxidised, it has lost an electron, leaving it with a +1 charge, so the ionic equation is: $Na \rightarrow Na^+ + e^-$**
    - **if sodium +1 ion is reduced, it has gained an electron, leaving it with a charge of zero, so the ionic equation is: $Na^+ + e^- \rightarrow Na$**
    - **remember: the charges on each side of the equation should add up to the same number**
- **to be able to tell which element has been oxidised and which has been reduced in an equation:**
    - **e.g. $2Na + 2HCl \rightarrow 2NaCl + H_2$**
    - **HCl is made up of H^+ and Cl^- ions & NaCl is made up of Na^+ and Cl^- ions**
    - **looking at just sodium: $2Na \rightarrow 2Na^+$, so the ionic equation must be: $2Na \rightarrow 2Na^+ + 2e^-$, meaning sodium has lost electrons & has been oxidised**
    - **looking at just chlorine: $2Cl^- \rightarrow 2Cl^-$, meaning chlorine has not been oxidised or reduced**
    - **looking at just hydrogen: $2H^+ \rightarrow H_2$, so the ionic equation must be: $2H^+ + 2e^- \rightarrow H_2$, meaning hydrogen has gained electrons so has been reduced**