CC13: Groups in the Periodic Table

1. Group 1

Alkali metals	The name we give to group 1 – lithium, sodium, potassium and so on.
Group 1 symbols	Li – lithium Na – sodium K – potassium
Properties of alkali metals	- soft - relatively low melting points
Reaction of alkali metals with water	Metal + water $\rightarrow$ metal hydroxide + hydrogen E.g: sodium + water $\rightarrow$ sodium hydroxide + hydrogen $2Na + 2H_2O \rightarrow 2NaOH + H_2$
Lithium and water	Floats. Bubbles (of hydrogen). Moves slowly.
Sodium and water	Floats. Melts. Bubbles (of hydrogen). Moves more quickly
Potassium and water	Floats. Melts. Bubbles (of hydrogen) **catch fire (lilac flame)**. Moves very quickly
Group 1 reactivity	Reactivity increases as you move down the group.
Explaining group 1 reactivity	When metals react they **lose** their outer electrons. Further down the group there are: - **more** shells of electrons - so the outer electrons are **further** from the nucleus - so outer electrons are **less attracted** to the nucleus - so outer electrons are **easier to remove.** **OPPOSITE PATTERN TO GROUP 7**

2. Group 7

Halogens	The name given to group 7 – fluorine, chlorine, bromine and iodine.
Chlorine	Cl_2. A pale green gas.
Bromine	Br_2. A red-brown liquid.
Iodine	I_2. A shiny purple-black solid.
Reaction of halogens with metals	Halogen + metal $\rightarrow$ metal halide E.g: Bromine + sodium $\rightarrow$ sodium bromide $Br_2 + 2Na \rightarrow 2NaBr$
Reaction of halogens with hydrogen	Halogen + hydrogen $\rightarrow$ hydrogen halide E.g: Chlorine + hydrogen $\rightarrow$ hydrogen chloride $Cl_2 + H_2 \rightarrow 2HCl$
Hydrogen halides	Hydrogen halides dissolve in water to form acids, for example hydrogen chloride makes hydrochloric acid.
Chlorine test	Chlorine gas turns **damp blue litmus red** then quickly bleaches it **white**.

3. Reactivity of halogens

Group 7 reactivity	Reactivity increases as you go up the group.
Explaining group 7 reactivity	When non-metals react they complete their outer shells. Going up the group there are: - **less** shells of electrons - so the outer electrons are **closer** to the nucleus - so outer electrons are **more attracted** to the nucleus - so **more able to hold** an extra outer electron **OPPOSITE PATTERN TO GROUP 1**
Displacement reactions	Reactions in which a more reactive metal displaces a less reactive metal from a salt eg: *copper sulfate + zinc $\rightarrow$ zinc sulfate + copper* Does not work backwards as copper is less reactive than zinc.
Displacement reactions of halogens	A **more** reactive halogen displaces a **less** reactive halide ion by taking its electrons. E.g: bromine + sodium iodide $\rightarrow$ iodine + sodium bromide $Br_2 + 2NaI \rightarrow I_2 + 2NaBr$ [bromine more reactive]
Redox reactions of halogens	Displacement reactions are REDOX because the more reactive halogen **oxidises** the less reactive halide by **taking its electrons**. The more reactive halogen is reduced. E.g: $Br_2 + 2I^- \rightarrow 2Br^- + I_2$
OIL RIG	**O**xidation **I**s **L**oss (of electrons) **R**eduction **I**s **G**ain (of electrons)

4. Group 0

Noble gases	The name given to group 0 – helium, neon, argon, krypton and xenon.
Melting point of noble gases	They are all gases at room temperature but the melting and boiling point increase down the group.
Reactivity of group 0	The noble gases do not (easily) do any reactions – they are inert.
Explaining reactivity of group 0	When elements react they try to complete their outer shells. Because group 0's outer shells are already complete, they do not react.
Uses of noble gases	-Helium is used in airships because it is inert and has low density - Argon is used in fire extinguishers because it is inert and denser than air. - Neon is used in lighting because it glows red when electricity is passed through it.