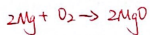


Group 2.

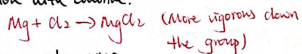
• Reactivity

- increase down the group.
- great atomic radii
- greater shielding
- decreasing attraction.
- easier to lose valence electrons down the group.

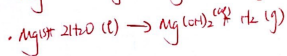
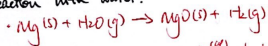
• Reactions with oxygen



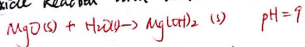
• Reaction with chlorine.



• Reaction with water.



• Oxide Reaction with Water



- Others give lower pH as they are not soluble.

Solubility

- Hydroxides

Increase down the group
($\text{Mg}(\text{OH})_2$ is used to neutralise acid in stomach)

- Sulfate

decrease down the group
(Barium meal to show soft tissues in X-rays)

Thermal stability

- Nitrates

more stable down the group.
- larger ions, same charge

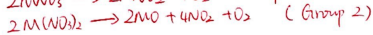
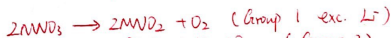
- less charge density

- less polarising effect on nitrates

- bonds between N and O are less weakened

- Carbonates

same trend and same reasons
(Group 1 exc. Li^+ doesn't decompose)



Flame test

- Method

Platinum (in HCl conc)

Sample

Above flame

- Explanation

- Heat promotes electrons to a higher energy level
- Electrons are unstable at a higher level and drop back down.
- Energy is emitted in the form of visible light.

- Colour

Li: Scarlet Red

Mg: X

Na: Yellow

Ca: Brick Red

K: Lilac

St: Red

Rb: Red

Bi: Apple Green

Cs: Blue

Group 7

F₂: pale yellow gas.

Cl₂: greenish gas.

Br₂: Red liquid that gives off brown fumes

I₂: grey solid that sublimates to purple gas.

Boiling Point

Increase down the group

- larger molecules, more e⁻

- larger ZDF

- Greater energy, high bp

Electronegativity

decrease down the group.

- radius ↑ due to shells ↑
- less attraction from nuclei

Same for reactivity

Oxidising Agent (Halogen)



Reducing Agent (halide)



Observations

Aqueous

Cl₂ very pale green

Br₂ yellow solution

I₂ brown solution

Organic

colourless

yellow

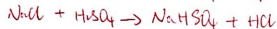
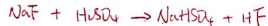
purple

Reaction with NaOH

- $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{HClO}$ (kill bacteria, treat drinking water, swimming pool)
- $\text{Cl}_2 + 2\text{NaOH} \rightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$
(cold) (Bleach)
- $3\text{Cl}_2 + 6\text{NaOH} \rightarrow 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$
(hot)

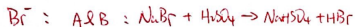
Reaction with conc. Sulfuric Acid

F^- & Cl^-



Observations: white misty fumes.

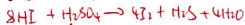
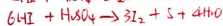
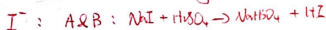
Acid and Base Reaction. No redox.



white misty fumes (HBr)

Red fumes (Br_2)

Acidic, colourless gas (SO_2)



white misty fumes (HI)

Black residue and purple vapour (I_2)

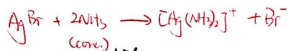
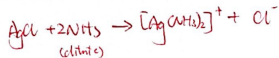
Gas with a bad egg smell (H_2S)

Test for halides

Reagent: AgNO_3 with Nitric Acid



Reagent: Ammonia

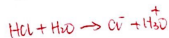


Producing hydrogen halide



no redox, no other compounds.

Dissolve in water



Reaction with NH_3

