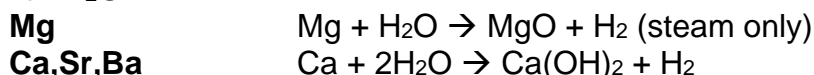
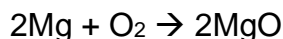


AS EQUATIONS - Unit 2

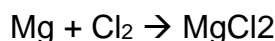
Group 2 metals – with H₂O



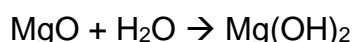
Group 2 metals – with O₂



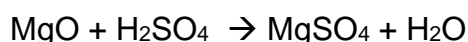
Group 2 metals – with Cl₂



Group 2 Oxides – with H₂O



Group 2 Oxides – with acids



Thermal stability

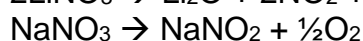
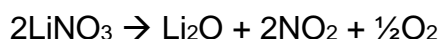
Group 1 Carbonates

All stable to heat except for Li₂CO₃

Group 2 Carbonates



Group 1 Nitrates **Li:** **Na, K, Rb, Cs**



Group 2 – Nitrates



Solubility

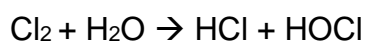
Group 1 and 2 Sulphates

Decreases down the group - BaSO₄ is insolubl

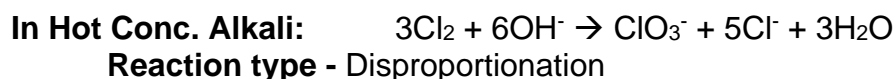
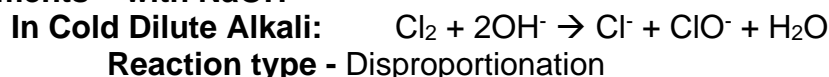
Group 1 and 2 Hydroxides

Increases down the group - Mg(OH)₂ is insoluble

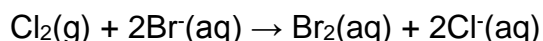
Group 7 elements – with H₂O



Group 7 elements – with NaOH



Group 7 – Displacement reactions

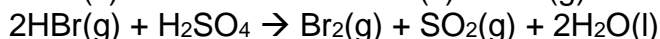


Observations Green gas → orange solution

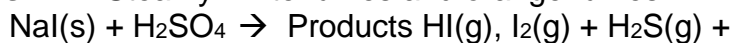
Halide ions – with conc H₂SO₄



Observations Steamy white fumes

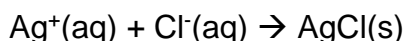


Observations Steamy white fumes and orange fumes



Observations Steamy white fumes and purple fumes

Test for halide ions



Observations White ppt – soluble in dilute ammonia

Halogenoalkanes - with aqueous OH⁻ $\text{CH}_3\text{CH}_2\text{Br} + \text{OH}^- \rightarrow \text{CH}_3\text{CH}_2\text{OH} + \text{Br}^-$
Mechanism = Nucleophilic substitution (S_N1 or S_N2)

with ethanolic OH⁻ $\text{CH}_3\text{CH}_2\text{Br} + \text{OH}^- \rightarrow \text{H}_2\text{C}=\text{CH}_2 + \text{Br}^- + \text{H}_2\text{O}$
Mechanism = Elimination

Halogenoalkanes - with CN⁻ $\text{CH}_3\text{CH}_2\text{Br} + \text{CN}^- \rightarrow \text{CH}_3\text{CH}_2\text{CN} + \text{Br}^-$
Mechanism = Nucleophilic substitution

Halogenoalkanes - with aqueous silver nitrate
 $\text{CH}_3\text{CH}_2\text{Br} + \text{H}_2\text{O} + \text{Ag}^+ \rightarrow \text{CH}_3\text{CH}_2\text{OH} + \text{AgBr}$
Fastest halogenoalkane = Iodo
Explanation = C-I bond is weaker than C-Br and C-Cl

Halogenoalkanes - with NH₃ $\text{CH}_3\text{CH}_2\text{Br} + \text{NH}_3 \rightarrow \text{CH}_3\text{CH}_2\text{NH}_2 + \text{HBr}$
Conditions Conc NH₃ / heat / closed vessel

Preparation of halogenoalkanes

Chloroalkanes from alcohols $\text{CH}_3\text{CH}_2\text{OH} + \text{Cl}^- \rightarrow \text{CH}_3\text{CH}_2\text{Cl} + \text{OH}^-$
Conditions H₂SO₄ / NaCl / heat

Bromoalkanes from alcohols $\text{CH}_3\text{CH}_2\text{OH} + \text{Br}^- \rightarrow \text{CH}_3\text{CH}_2\text{Br} + \text{OH}^-$
Conditions NaBr / H₃PO₄ / Heat

Not H₂SO₄ / NaBr / heat as Br₂ will form

Iodoalkanes from alcohols $\text{CH}_3\text{CH}_2\text{OH} + \text{I}^- \rightarrow \text{CH}_3\text{CH}_2\text{I} + \text{OH}^-$
Conditions PI₃ or P / I₂

Not H₂SO₄ / NaI / heat as I₂ will form

Alcohols – 1° Partial Oxidation $\text{CH}_3\text{CH}_2\text{OH} + [\text{O}] \rightarrow \text{CH}_3\text{CHO} + \text{H}_2\text{O}$
Conditions Distil product as it is formed

Alcohols – 1° Complete Oxidation $\text{CH}_3\text{CH}_2\text{OH} + 2[\text{O}] \rightarrow \text{CH}_3\text{CO}_2\text{H} + \text{H}_2\text{O}$
Conditions HUR

Alcohols – 2° Oxidation $\text{CH}_3\text{CHOHCH}_3 + [\text{O}] \rightarrow \text{CH}_3\text{COCH}_3 + \text{H}_2\text{O}$

Alcohols – Dehydration $\text{CH}_3\text{CH}_2\text{OH} \rightarrow \text{H}_2\text{C}=\text{CH}_2 + \text{H}_2\text{O}$
Conditions HUR / NaOH – Aqueous

Alcohols – Reaction with sodium $\text{CH}_3\text{CH}_2\text{OH} + \text{Na} \rightarrow \text{CH}_3\text{CH}_2\text{O}^-\text{Na}^+ + \frac{1}{2} \text{H}_2$
Observation Colourless effervescence