

Reactivity Series

Potassium
Sodium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Lead
Hydrogen
Copper
Silver
Gold

Addition of Sodium Hydroxide

Cation	A few drops	In excess
Al^{3+}	White ppt	Ppt dissolves to give colourless soln
Ca^{2+}	White ppt	Ppt is insoluble
Cu^{2+}	Light blue ppt	Ppt is insoluble
Fe^{2+}	Green ppt	Ppt is insoluble
Fe^{3+}	Reddish-brown ppt	Ppt is insoluble
Pb^{2+}	White ppt	Ppt dissolves to give colourless soln
Zn^{2+}	White ppt	Ppt dissolves to give colourless soln
NH_4^+	No ppt	Ammonia gas evolved upon heating

Addition of Aqueous Ammonia

Cation	A few drops	In excess
$*Al^{3+}$	White ppt	Ppt is insoluble
Ca^{2+}	No ppt	-

Addition of Aqueous Ammonia (cont)

Cu^{2+}	Light blue ppt	Ppt dissolves to give dark blue soln
Fe^{2+}	Green ppt	Ppt is insoluble
Fe^{3+}	Reddish-brown ppt	Ppt is insoluble
$*Pb^{2+}$	White ppt	Ppt is insoluble
Zn^{2+}	White ppt	Ppt dissolves to give colourless soln

$*Al^{3+}$ and Pb^{2+} can be identified by using aqueous potassium iodide (KI) which forms yellow ppt in the presence of lead.

Amphoteric Metal Oxides

Zinc (Zn)

Aluminum (Al)

Lead (Pb)

Mnemonic is ZAP

Acidic Oxides

Sulfur Trioxide	SO_3	Sulfuric Acid	H_2SO_4
*Sulfur Dioxide	SO_2	Sulphurous Acid	H_2SO_3
Nitrogen Dioxide	NO_2	Nitric Acid	HNO_3
*Dinitrogen Pentoxide	N_2O_5	Nitric Acid	HNO_3
Carbon Dioxide	CO_2	Carbonic Acid	HCO_3
*Phosphorus (V) Oxide	P_4O_{10}	Phosphoric Acid	H_3PO_4
*Phosphorus (III) Oxide	P_4O_6	Phosphorous Acid	H_3PO_3
*Manganese Heptoxide	Mn_2O_7	Perman-ganic Acid	$HMnO_4$
*Dichlorine Monoxide	Cl_2O	Hypochlorous Acid	$HOCl$
*Dichlorine Heptoxide	Cl_2O_7	Perchloric Acid	$HClO_4$

*Advanced (NIS)

Basic Oxides

All Group I and II metals (except Beryllium) Li_2O , Na_2O , MgO , CaO , etc.

*Thallium (I) Oxide Tl_2O

*Bismuth (III) Oxide Bi_2O_3

*Advanced (NIS)

Always Soluble

Sodium	Na^+
Potassium	K^+
Ammonia	NH_4^+
Nitrate	NO_3^-

Mnemonic: SPAN

Soluble Salts

All halides Except Pb and Ag compounds (e.g. $PbCl_2$)

All sulphates Except Ba, Ca (sparingly soluble) and Pb (e.g. $BaSO_4$)

Insoluble Salts

All Carbonates Except SPA (Sodium, Potassium, Ammonium)

All Phosphates Group I Metals and Ammonium compounds

All Hydroxides Except SPCM (Sodium, Potassium, Calcium - sparingly soluble, Magnesium - very sparingly soluble)