# Solubility and Qualitative Tests Cheat Sheet

by peaceknight05 via cheatography.com/126547/cs/26879/

## 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 |
| $NH4^{+}$ | 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 | SO3 | Sulfuric Acid | H2SO4 |
| *Sulfur Dioxide | SO2 | Sulphurous Acid | H2SO3 |
| Nitrogen Dioxide | NO2 | Nitric Acid | HNO3 |
| *Dinitrogen Pentoxide | N2O5 | Nitric Acid | HNO3 |
| Carbon Dioxide | CO2 | Carbonic Acid | HCO3 |
| *Phosphorus (V) Oxide | P4O10 | Phosphoric Acid | H3PO4 |
| *Phosphorus (III) Oxide | P4O6 | Phosph-orous Acid | H3PO3 |
| *Manganese Heptoxide | Mn2O7 | Perman-ganic Acid | HMnO4 |
| *Dichlorine Monoxide | Cl2O | Hypoch-lorous Acid | HOCl |
| *Dichlorine Heptoxide | Cl2O5 | Perchloric Acid | HClO4 |

*Advanced (NIS)

## Basic Oxides

| | |
|---|---|
| All Group I and II metals (except Beryllium) | Li2O, Na2O, MgO, CaO, etc. |
| *Thallium (I) Oxide | Tl2O |
| *Bismuth (III) Oxide | Bi2O3 |

*Advanced (NIS)

## Always Soluble

| | |
|---|---|
| Sodium | $Na^{+}$ |
| Potassium | $K^{+}$ |
| Ammonia | $NH4^{+}$ |
| Nitrate | $NO3^{-}$ |

Mnemonic: SPAN

## Soluble Salts

| | |
|---|---|
| All halides | Except Pb and Ag compounds (e.g. PbCl2) |
| All sulphates | Except Ba, Ca (sparingly soluble) and Pb (e.g. BaSO4) |

## 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) |

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