Inorganic Revision Sheet
Metal Aqua Ion Reactions for Edexcel

Fe^{2+}, Fe^{3+}, Cu^{2+}, Cr^{3+} and Co^{2+}

Iron (II), Fe^{2+}

dropwise NaOH or NH_3 = green ppt
excess NaOH = no change
excess NH_3 = no change

$[Fe(H_2O)_6]^{2+}(aq)$ —NaOH(aq) dropwise→ $Fe(H_2O)_4(OH)_2(s)$ —NaOH(aq) excess→ No change
green solution → green precipitate

$[Fe(H_2O)_6]^{2+}(aq)$ —NH_3(aq) dropwise→ $Fe(H_2O)_4(OH)_2(s)$ —NH_3(aq) excess→ No change
green solution → green precipitate

Iron (III), Fe^{3+}

dropwise NaOH or NH_3 = brown ppt
excess NaOH = no change
excess NH_3 = no change

$[Fe(H_2O)_6]^{3+}(aq)$ —NaOH(aq) dropwise→ $Fe(H_2O)_3(OH)_3(s)$ —NaOH(aq) excess→ No change
yellow solution → brown precipitate

$[Fe(H_2O)_6]^{3+}(aq)$ —NH_3(aq) dropwise→ $Fe(H_2O)_3(OH)_3(s)$ —NH_3(aq) excess→ No change
yellow solution → brown precipitate

Copper (II), Cu^{2+}

dropwise NaOH or NH_3 = blue ppt
excess NaOH = no change
excess NH_3 = deep blue solution

$[Cu(H_2O)_6]^{2+}(aq)$ —NaOH(aq) dropwise→ $Cu(H_2O)_4(OH)_2(s)$ —NaOH(aq) excess→ No change
blue solution → blue precipitate

$[Cu(H_2O)_6]^{2+}(aq)$ —NH_3(aq) dropwise→ $Cu(H_2O)_4(OH)_2(s)$ —NH_3(aq) excess→ $[Cu(NH_3)_4(H_2O)_2]^{2+}(aq)$
blue solution → blue precipitate → deep blue solution

Chromium (III), Cr^{3+}

dropwise NaOH or NH_3 = green ppt
excess NaOH = green solution
excess NH_3 = purple solution

$[Cr(H_2O)_6]^{3+}(aq)$ —NaOH(aq) dropwise→ $Cr(H_2O)_3(OH)_3(s)$ —NaOH(aq) excess→ $[Cr(OH)_6]^{3-}(aq)$
violet solution → green precipitate → green solution

$[Cr(H_2O)_6]^{3+}(aq)$ —NH_3(aq) dropwise→ $Cr(H_2O)_3(OH)_3(s)$ —NH_3(aq) excess→ $[Cr(NH_3)_6]^{3+}(aq)$
violet solution → green precipitate → purple solution

Cobalt (II), Co^{2+}

dropwise NaOH or NH_3 = blue ppt
excess NaOH = no change
excess NH_3 = yellow solution

$[Co(H_2O)_6]^{2+}(aq)$ —NaOH(aq) dropwise→ $Co(H_2O)_4(OH)_2(s)$ —NaOH(aq) excess→ no change
pink solution → blue precipitate

$[Co(H_2O)_6]^{2+}(aq)$ —NH_3(aq) dropwise→ $Co(H_2O)_4(OH)_2(s)$ —NH_3(aq) excess→ $[Co(NH_3)_6]^{2+}(aq)$
pink solution → blue precipitate → yellow solution

Inorganic Revision Sheet
Metal Aqua Ion Reactions for Edexcel

Vanadium Colours

Can reduce Vanadium from +5 oxidation state to +2 using zinc in acid solution.

Oxidation State	Colour
+2 V^{2+}	Purple
+3 V^{3+}	Green
+4 VO^{2+}	Blue
+5 VO_2^+	Yellow

Ligand Exchange

Copper (II), Cu^{2+}

$[Cu(H_2O)_6]^{2+}(aq) + 4Cl^-(aq) \rightarrow [Cu(Cl)_4]^{2-}(aq) + 6H_2O(l)$

blue solution → *yellow solution*

Cobalt (II), Co^{2+}

$[Co(H_2O)_6]^{2+}(aq) + 4Cl^-(aq) \rightarrow [Co(Cl)_4]^{2-}(aq) + 6H_2O(l)$

pink solution → *blue precipitate*