

Review of Inorganic Chemistry

Colours of Solids

Colour	Solid
Yellow-brown	FeCl ₃ (hydrated)
Red-brown	Fe ₂ O ₃ , Fe(OH) ₃ , Cu ₂ O
Red	K ₄ Fe(CN) ₆
Pink	Hydrated Co ⁺² , hydrated Mn ⁺² (very pale - colourless)
Yellow	BaCrO ₄ , PbCrO ₄ , PbI ₂ , AgBr (cream), AgI (pale yellow), soluble chromates
Green	Hydrated Fe ⁺² , hydrated Ni ⁺² , hydrated Cr ⁺³ ,
Blue	Hydrated Cu ⁺² , anhydrous Co ⁺²
Purple	Chromium (III), KMnO ₄ (purple lustre)
Black	CuO, MnO ₂ , sulphides of Cu ⁺² , Co ⁺² , Pb ⁺² , Fe ⁺² , Ag ⁺¹

Colours of Solutions

Colour	Possible Ions Present
Brown	Fe ⁺³
Orange	Cr ₂ O ₇ ⁻²
Yellow	CrO ₄ ⁻² , Br _{2(aq)}
Green	Cr ⁺² , Ni ⁺² , Fe ⁺² , Cr ⁺³ , MnO ₄ ⁻²
Blue	Cu ⁺² , Co ⁺² , Cu(NH ₃) ₄ ⁺² , Ni(NH ₃) ₆ ⁺²
Purple	MnO ₄ ⁻¹
Pink	Mn ⁺² , Co ⁺²

Tests for Gases

Gas	Colour, Odour	Test	Result if Positive
H ₂	colourless, odourless	ignite using a lighted splint	mildly explosive, "pop"
O ₂	colourless, odourless	glowing splint	Re-ignites
CO ₂	colourless, odourless	bubble through Ca(OH) _{2(aq)}	turns milky
NH ₃	colourless, pungent	moist red litmus paper	turns blue
HCl	colourless, pungent	bring into contact with a drop of NH _{3(aq)}	dense white fumes of NH ₄ Cl
I ₂	violet, pungent gas, condensing to black-silvery crystals		

Flame Tests

Colour of Flame	Ion Probably Present
Lilac	K ⁺¹
Red	Li ⁺¹
Crimson	Sr ⁺²
Brick-red	Ca ⁺²
Golden-yellow	Na ⁺¹
Green: apple	Ba ⁺²
bluish	Cu ⁺²

Tests for Anions

Ion	Test	Result if Positive
Cl^{-1}	$\text{AgNO}_{3(\text{aq})}$	White ppte of AgCl
Br^{-1}	(1) $\text{AgNO}_{3(\text{aq})}$ (2) Chlorine water, $\text{Cl}_{2(\text{aq})}$, followed by a few drops of TTE	Pale cream ppte of AgBr orange -yellow layer of $\text{Br}_{2(\text{l})}$ seen in TTE
I^{-1}	(1) $\text{AgNO}_{3(\text{aq})}$ (2) Chlorine water, $\text{Cl}_{2(\text{aq})}$, followed by a few drops of TTE	Yellow ppte of AgI Pink-purple layer of $\text{I}_{2(\text{l})}$ seen in TTE
CO_3^{-2}	to solid add dil. $\text{HCl}_{(\text{aq})}$	Effervescence, colourless gas turns $\text{Ca}(\text{OH})_{2(\text{aq})}$ milky
SO_4^{-2}	add $\text{BaCl}_{2(\text{aq})}$	White ppte of BaSO_4
$\text{CH}_3\text{COO}^{-1}$	to solid or solution, add dil. H_2SO_4	Smell of vinegar from displaced weak acid CH_3COOH

Some Common Oxidizing Agents and Reducing Agents

Oxidizing Agent

F_2 , Cl_2 , Br_2 , O_2 , S
 MnO^{-1} , MnO_2 (in $\text{H}^{+1}_{(\text{aq})}$)
 $\text{Cr}_2\text{O}_7^{-2}$ (in H^{+1})
 H_2O_2
 ClO_3^{-1} , ClO^{-1} , BrO_3^{-1} , IO_3^{-1}
 HNO_3 , HNO_2 , NO_3^{-1}
 H_2SO_4
 Cu^{+1} , Cu^{+2} , Fe^{+3} , Ag^{+1}

Usual Reduction Product

F^{-1} , Cl^{-1} , Br^{-1} , O^{-2} , S^{-2}
 Mn^{+2}
 Cr^{+3}
 H_2O
 Cl^{-1} , Cl_2 , Br^{-1} , Br_2 , I^{-1} , I_2
 NO , NO_2 , N_2O_4 , N_2O
 SO_2 , H_2S , S
 Cu , Fe^{+2} , Fe , Ag

Reducing Agent

Li , Na , K , Mg , Ca , Al ,
 Al , Sn , Fe , Zn
 Fe^{+2} , Sn^{+2}
 H_2
 I^{-1}
 S^{-2} , H_2S
 SO_3^{-2}
 NH_3 , N_2H_4

Usual Oxidation Product

Li^{+1} , Na^{+1} , K^{+1} , Mg^{+2} , Ca^{+2}
 Al^{+3} , Sn^{+2} ($+4$), Fe^{+2} ($+3$), Zn^{+2}
 Fe^{+3} , Sn^{+4}
 H^{+1}
 I_2
 S
 SO_4^{-2}
 N_2