QA Notes Cheat Sheet

IONS		NaOH			Aq. NH_3		
Cu^{2+}		Light blue ppt		Insoluble in excess		Light blue ppt		Soluble in excess to give a dark blue solution	
Fe^{2+}		Green ppt		Insoluble in excess		Green ppt		Insoluble in excess	
*Fe^{3+}		Red-brown ppt		Insoluble in excess		Red-brown ppt		Insoluble in excess	

Note: On standing in air (oxygen), the dirty-green ppt of $Fe(OH)_2$ turns reddish-brown due to the oxidation of Fe^{2+} ions.

*Colour of solution containing Fe^{3+} range from colourless to pale yellow depending on concentrating of Fe^{3+}.

IONS		NaOH			Aq. NH_3		
Pb^{2+}		White ppt		Soluble in excess to give colourless solution		White ppt		Insoluble in excess	
Al^{3+}		White ppt		Soluble in excess to give colourless solution		White ppt		Insoluble in excess	
Zn^{2+}		White ppt		Soluble in excess to give colourless solution		White ppt		Soluble in excess to give colourless solution	
Ca^{2+}		White ppt		Insoluble in excess		**No ppt (solution remained colourless)**			

Annex 4: Notes for QA***

NOTES FOR QUALITATIVE ANALYSIS

(This is given in the exams. Do not need to memorize for paper 3)

Test for anions

anion	***test***	***test result***
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Test for aqueous cations

cation	***effect of aqueous sodium hydroxide***	***effect of aqueous ammonia***
aluminium (Al^{3+})	white ppt., soluble in excess giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	--
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt.
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
lead(II) (Pb^{2+})	white ppt., soluble in excess giving a colurless solution	white ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess giving a colurless solution	white ppt., soluble in excess giving a colourless solution

[Lead(II) ions can be distinguished from aluminium ions by the insolubility of lead(II) chloride.]

Test for gases

gas	***test and test result***
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	gives white ppt. with limewater (ppt. dissolves with excess CO_2)
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	“pops” with a lighted splint
oxygen (O_2)	relights a glowing splint
sulfur dioxide (SO_2)	turns aqueous acidified potassium manganate(VII) from purple to colourless