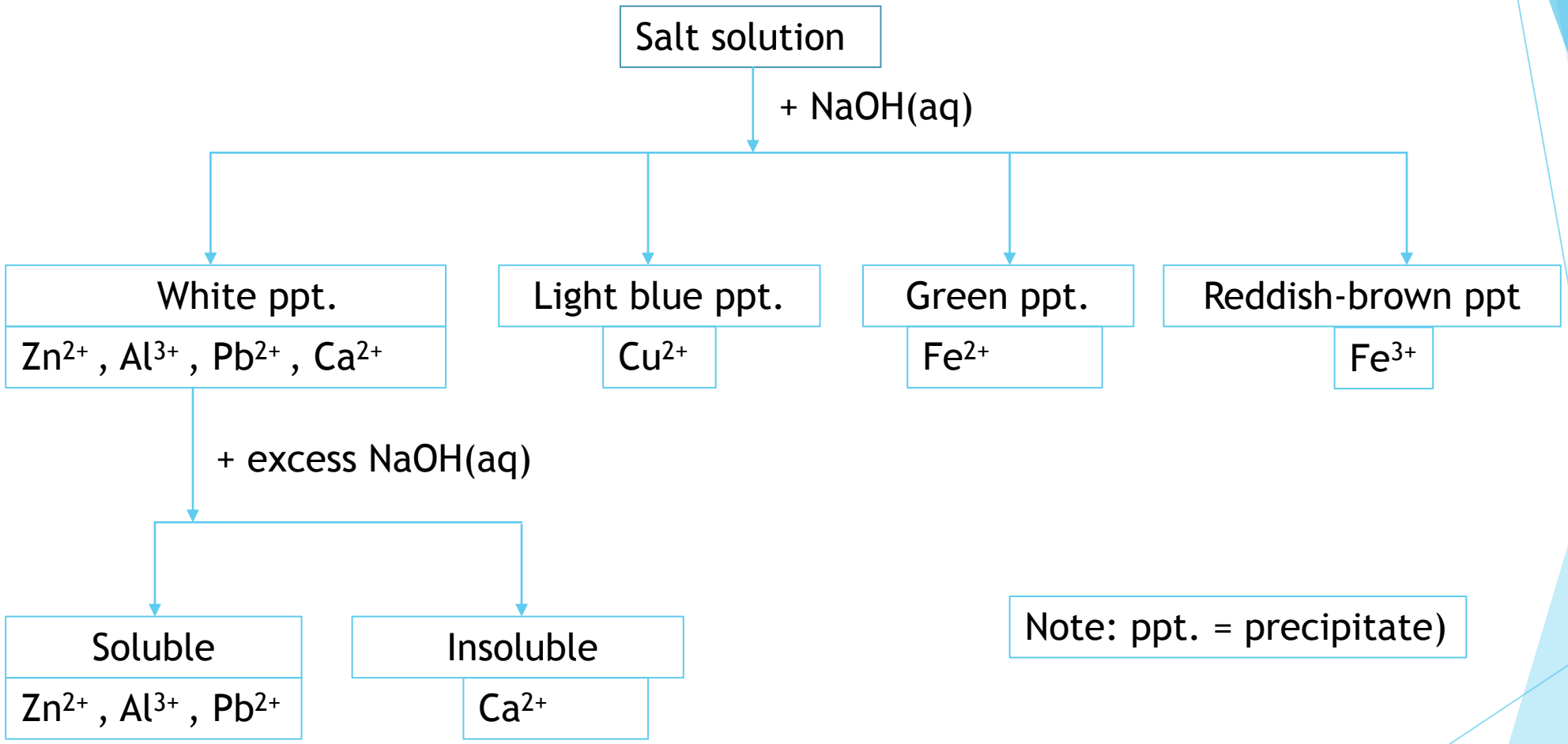
Qualitative Analysis

www.JimmyTuition.com

Identifying Cations (positive ions)

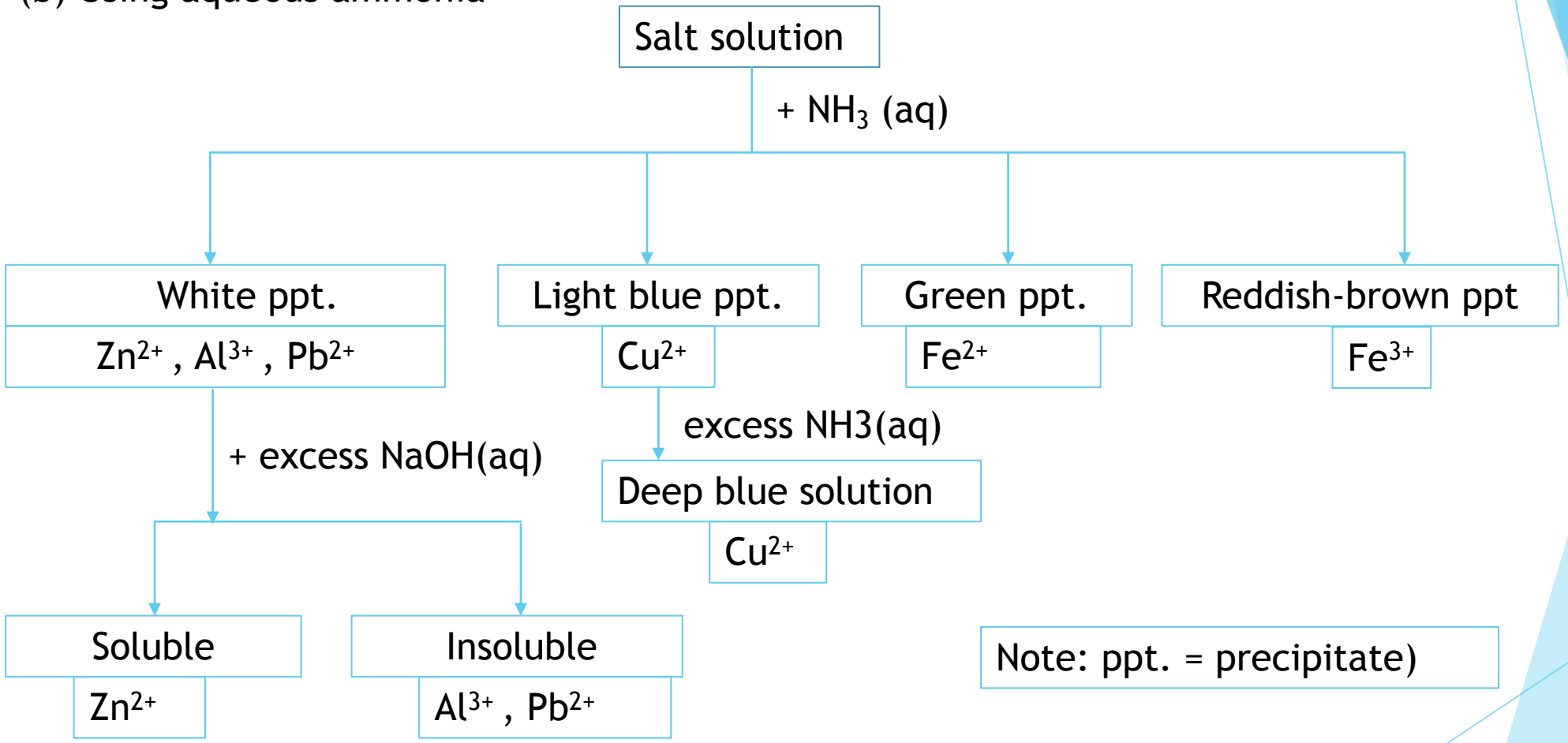
(a) Using sodium hydroxide solution



Note: ppt. = precipitate)

Identifying Cations (positive ions)

(b) Using aqueous ammonia

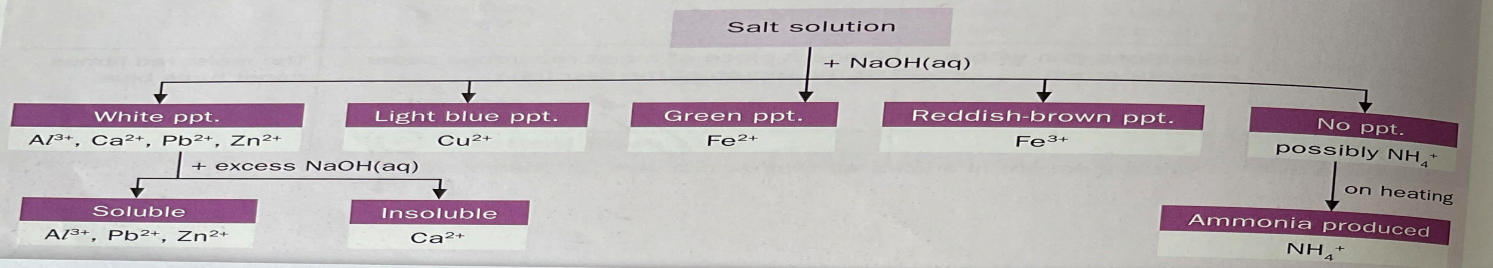


Note: ppt. = precipitate)

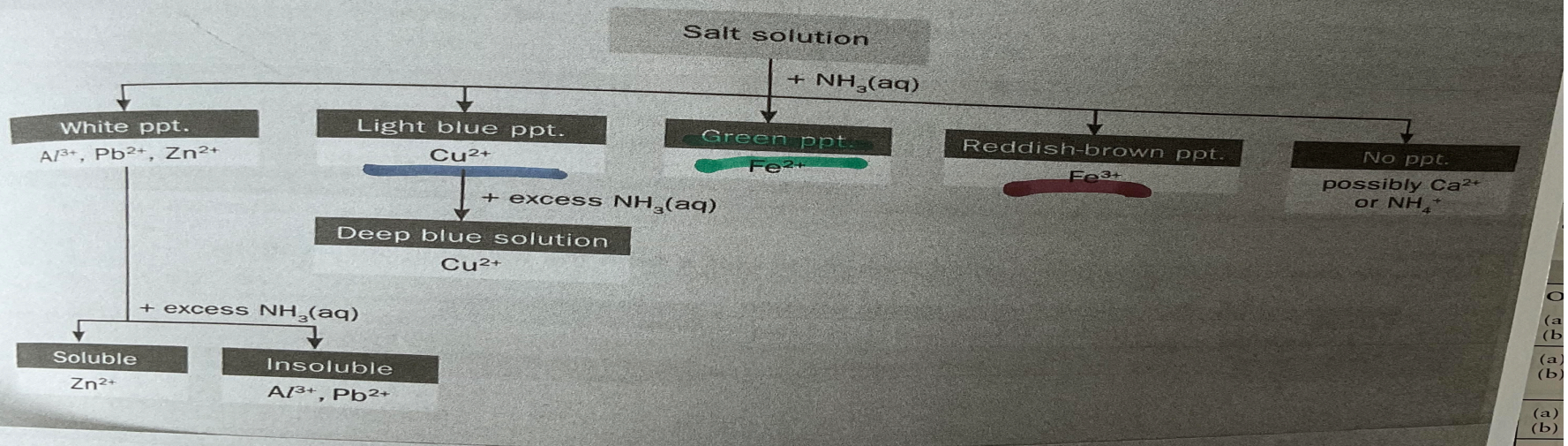
Key Ideas

1. Identifying cations (note: ppt. = precipitate):

(a) Using sodium hydroxide solution



(b) Using aqueous ammonia



Identifying Anions(negative ions)

Anion	Test	Observation for positive test and inference
Carbonate ions, CO_3^{2-}	Add dilute hydrochloric acid, Pass the gas given off into limewater [$Ca(OH)_2$]	*Effervescence* is observed Gas given off forms a *white precipitate* ($CaCO_3$) with limewater. Carbon dioxide gas is given off.
Chloride ion, Cl^-	Add dilute nitric acid, then add silver nitrate $AgNO_3$ solution.	A *white* precipitate of silver chloride AgCl is formed
Iodine ion, I^-	Add dilute nitric acid, then add silver nitrate$AgNO_3$ or lead(II) nitrate $Pb(NO_3)2$ solution.	A *yellow* precipitate of silver iodine AgI or lead(II) iodine PbI_2 is formed
Sulfate ion, SO_4^{2-}	Add dilute nitric acid, then add barium nitrate solution.	A ***white*** precipitate of barium sulfate is formed
Nitrate ion, NO_3^-	Add sodium hydroxide solution, then add a piece of aluminium foil, warm the mixture.	Effervescence is observed. Test the gas with a piece of moist *red* litmus paper, it turns *blue*.

Identifying gases

gas	colour	odour	Test	Observation
Hydrogen, H_2	Colourless	odourless	Place a lighted splint at the mouth of the test tube.	The lighted splint is extinguished with a “pop” sound.
Oxygen, O_2	Colourless	odourless	Insert a glowing splint into the test tube.	The glowing splint is rekindled (i.e. catches fire again).
Carbon dioxide, CO_2	Colourless	odourless	Bubble gas through limewater.	White precipitate formed
Chlorine, Cl_2	Greenish yellow	Pungent	Place a piece of moist red litmus paper at the mouth of the test tube	The moist red litmus paper turns blue
sulfur dioxide, SO_2	Colourless	pungent	Place a piece of filter paper soaked with acidified potassium manganate(VII) at the mouth of the test tube	Solution turn from purple to colourless
Ammonia, NH_3	colourless	pungent	Place a piece of damp red litmus paper at the mouth of the test tube	The damp red litmus paper turns blue