qualitative analysis

Date: 29 / 1 /24

LO1 Describe the use of aqueous sodium hydroxide and/or aqueous ammonia to identify aqueous cations through the formation of precipitates and their subsequent solubility.

cation	Reaction w NaOH (aq) (strong alkali)	Reaction w NH_3 (aq) (weak alkali)
copper (II) Cu^{2+}	- Blue precipitate of $Cu(OH)_2$ forms - Precipitate is insoluble in excess NaOH	- Blue precipitate of $Cu(OH)_2$ forms - Precipitate dissolves in excess NH_3 to give dark blue solution
Iron (II) Fe^{2+}	- Green precipitate of $Fe(OH)_2$ forms - Precipitate is insoluble in excess NaOH	- Green precipitate of $Fe(OH)_2$ forms - Precipitate is insoluble in excess NH_3
Iron (III) Fe^{3+}	- Red-brown precipitate of $Fe(OH)_3$ forms - Precipitate is insoluble in excess NaOH	- Red-brown precipitate of $Fe(OH)_3$ forms - Precipitate is insoluble in excess NH_3
Calcium Ca^{2+}	- White precipitate of $Ca(OH)_2$ forms - Precipitate is insoluble in excess NaOH	No visible reaction
Aluminium Al^{3+}	- White precipitate of $Al(OH)_3$ forms - Precipitate dissolves in excess NaOH to give colourless solution	- White precipitate of $Al(OH)_3$ forms - Precipitate is insoluble in excess NH_3
Zinc Zn^{2+}	- White precipitate of $Zn(OH)_2$ forms - Precipitate dissolves in excess NaOH to give colourless solution	- White precipitate of $Zn(OH)_2$ forms - Precipitate dissolves in excess NH_3 to give colourless solution
Ammonium NH_4^+	- Upon heating, ammonia gas produced turns moist red litmus paper blue	-

Today's mood:

- [ ] Craving coffee
- [ ] 11/10
- [ ] Logging off
- [ ] Main character energy
- [ ] BRB overthinking
- [ ] _____

To unpack tomorrow:

TYPO

Date: / /

LO 2 Describe tests to identify aqueous anions.

Anion	Test	Observation + ionic equation
Carbonate CO_3^{2-}	Add dilute hydrochloric acid and bubble the gas through limewater (calcium hydroxide, $Ca(OH)_2$)	Effervescence of colourless and odourless gas forms. When bubbled through limewater, a white precipitate of $CaCO_3$ is produced. $2H^+(aq) + CO_3^{2-}(aq) \rightarrow CO_2(g) + H_2O(l)$
Sulfate SO_4^{2-}	Add dilute nitric acid, followed by aqueous barium nitrate.	A white precipitate of barium sulfate is produced $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$
Chloride Cl^-	Add dilute nitric acid, followed by aqueous silver nitrate	A white precipitate of silver chloride is produced. $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$
Iodide I^-		A yellow precipitate of silver iodide is produced. $Ag^+(aq) + I^-(aq) \rightarrow AgI(s)$
Nitrate NO_3^-	Add aqueous sodium hydroxide, followed by aluminium foil. Warm the mixture.	Pungent ammonia gas is produced which turns moist red litmus paper blue. $NH_4^+(aq) + OH^-(aq) \rightarrow NH_3(g) + H_2O(l)$

Today's mood:

- [ ] Craving coffee
- [ ] 11/10
- [ ] Logging off
- [ ] Main character energy
- [ ] BRB overthinking
- [ ] _____

To unpack tomorrow:

TYPO

Date: / /

LO3 Describe tests to identify gases.

Gas	colour and odour	Test	Observation
carbon dioxide CO_2	colourless, odourless	Bubble the gas through limewater, $Ca(OH)_2$	A white precipitate, $CaCO_3$, is produced
Ammonia NH_3	colourless, pungent	Test ẅ a piece of moist red litmus paper	Moist red litmus paper turns blue
Chlorine Cl_2	yellow-green, pungent	Test ẅ a piece of moist blue litmus paper	Blue litmus paper first turns red and then bleached
Hydrogen H_2	colourless, odourless	Place a lighted splint near the gas	Gas extinguishes lighted splint ẅ a "pop" sound
Oxygen O_2	colourless, odourless	Place a glowing splint near the gas	Gas reignites glowing splint
Sulfur dioxide SO_2	colourless, pungent	Bubble the gas through a solution of acidified potassium dichromate(VI), $K_2Cr_2O_7$.	Acidified potassium dichromate (VI) turns from orange to green.
		Alternate: Bubble the gas through a solution of acidified potassium manganate (VII), $KMnO_4$	Acidified potassium manganate (VII) turns from purple to colourless

Today's mood:

- Craving coffee
- Main character energy
- 11/10
- BRB overthinking
- Logging off
- _____

To unpack tomorrow:

TYPO