

Name: _____

Nomenclature Quiz #1 - SCH 4C

C^{4-}	carbide	CO_3^{2-}	carbonate
N^{3-}	nitride	NO_3^{1-}	nitrate
O^{2-}	oxide	PO_4^{3-}	phosphate
F^{1-}	fluoride	SO_4^{2-}	sulphate
P^{3-}	phosphide	ClO_3^{1-}	chlorate
S^{2-}	sulphide	OH^{1-}	hydroxide
Cl^{1-}	chloride	CN^{1-}	cyanide
As^{3-}	arsenide		
Se^{2-}	selenide	NH_4^{1+}	ammonium
Br^{1-}	bromide		
Sb^{3-}	antimonide		
Te^{2-}	telluride		
I^{1-}	iodide		

1. Simple monovalent cation (only one oxidation state),
elemental anion (ends in ide)
- a) NaCl sodium chloride
- b) K_2O potassium oxide
- c) $MgCl_2$ magnesium chloride
- d) Al_2S_3 aluminum sulphide
- e) Cs_3N cesium nitride
- f) lithium arsenide Li_3As
- g) sodium bromide $NaBr$
- h) calcium phosphide Ca_3P_2
- i) magnesium carbide Mg_2C
- j) aluminum oxide Al_2O_3

2. Polyvalent Cation (more than one possible oxidation state), elemental anion.

1	2	3	4	5	6	7	8	9	10
I	II	III	IV	V	VI	VII	VIII	IX	X

- a) iron(II) chloride FeCl₂
- b) iron(II) sulphide FeS
- c) lead(IV) bromide PbBr₄
- d) lead(IV) oxide PbO₂
- e) tin(IV) nitride Sn₃N₄
- f) NiCl₂ nickel(II) chloride
- g) Au₂O₃ gold(III) oxide
- h) Hg₂O mercury(I) oxide
- i) CuCl₂ copper(II) chloride
- j) PI₃ phosphorus(III) iodide

3. Simple monovalent cation with polyatomic anions.

- a) sodium carbonate Na₂CO₃
- b) ammonium nitrate NH₄NO₃
- c) silver phosphate Ag₃PO₄
- d) zinc hydroxide Zn(OH)₂
- e) aluminum sulphate Al₂(SO₄)₃
- f) K₂CO₃ potassium carbonate
- g) Mg(ClO₃)₂ magnesium chlorate
- h) Sc₂(CO₃)₃ scandium carbonate
- i) Ca(OH)₂ calcium hydroxide
- j) Na₃PO₄ sodium phosphate

4. Polyvalent cation with polyatomic ion.

a) platinum(IV) chlorate Pt(ClO₃)₄

b) gold(I) sulphate Au₂SO₄

c) gold(III) carbonate Au₂(CO₃)₃

d) lead(IV) hydroxide Pb(OH)₄

e) iridium(VI) phosphate Ir(PO₄)₂

f) Au₃PO₄ gold(I) phosphate

g) Sb₂(SO₄)₅ antimony(V) sulphate

h) As(OH)₃ arsenic(III) hydroxide

i) Au(CN)₃ gold(III) cyanide

j) PbSO₄ lead(II) sulphate

5. Mixed Problems!!!!

a) CS₂ carbon(IV) sulphide

b) Na₂SO₄ sodium sulphate

c) SnCl₄ tin(IV) chloride

d) InCl₃ indium chloride

e) (NH₄)₂SO₄ ammonium sulphate

f) Cu(NO₃)₂ copper(II) nitrate

g) OsO₃ osmium(VI) oxide

h) Ni(ClO₃)₃ nickel(III) chlorate

i) Zr(SO₄)₂ zirconium sulphate

j) CrO₃ chromium(VI) oxide

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Nomenclature Quiz #2 - SCH 4C

C^{4-}	carbide	CO_3^{2-}	carbonate
N^{3-}	nitride	NO_3^{1-}	nitrate
O^{2-}	oxide	PO_4^{3-}	phosphate
F^{1-}	fluoride	SO_4^{2-}	sulphate
P^{3-}	phosphide	ClO_3^{1-}	chlorate
S^{2-}	sulphide	OH^{1-}	hydroxide
Cl^{1-}	chloride	CN^{1-}	cyanide
As^{3-}	arsenide		
Se^{2-}	selenide	NH_4^{1+}	ammonium
Br^{1-}	bromide		
Sb^{3-}	antimonide		
Te^{2-}	telluride		
I^{1-}	iodide		

1. Simple monovalent cation (only one oxidation state),
elemental anion (ends in ide)
- a) NaCl sodium chloride
- b) Al_2O_3 aluminum oxide
- c) Na_2O sodium oxide
- d) K_3N potassium nitride
- e) Li_2S lithium sulphide
- f) calcium sulphide CaS
- g) potassium oxide K_2O
- h) magnesium chloride $MgCl_2$
- i) zirconium sulphide ZrS_2
- j) zinc bromide $ZnBr_2$

2. Polyvalent Cation (more than one possible oxidation state), elemental anion.

1	2	3	4	5	6	7	8	9	10
I	II	III	IV	V	VI	VII	VIII	IX	X

- a) copper(II) nitride Cu_3N_2
- b) copper(I) nitride Cu_3N
- c) tin(IV) oxide SnO_2
- d) tin(II) oxide SnO
- e) lead(IV) nitride Pb_3N_4
- f) AuCl_3 gold(III) chloride
- g) PCl_5 phosphorus(V) chloride
- h) CuS copper(II) sulphide
- i) CuI copper(I) iodide
- j) As_2O_3 arsenic(III) oxide

3. Simple monovalent cation with polyatomic anions.

- a) lithium sulphate Li_2SO_4
- b) magnesium hydroxide $\text{Mg}(\text{OH})_2$
- c) zinc carbonate ZnCO_3
- d) sodium phosphate Na_3PO_4
- e) aluminum nitrate $\text{Al}(\text{NO}_3)_3$
- f) Na_2SO_4 sodium sulphate
- g) $\text{Ca}(\text{NO}_3)_2$ calcium nitrate
- h) K_2CO_3 potassium carbonate
- i) $(\text{NH}_4)_3\text{PO}_4$ ammonium phosphate
- j) KOH potassium hydroxide

4. Polyvalent cation with polyatomic ion.

- a) tin(II) carbonate SnCO₃
- b) gold(III) sulphate Au₂(SO₄)₃
- c) lead(II) phosphate Pb₃(PO₄)₂
- d) copper(II) sulphate CuSO₄
- e) mercury(I) oxide Hg₂O
- f) Au(OH)₃ gold(III) hydroxide
- g) Cu(ClO₃)₂ copper(II) chlorate
- h) Pb₃(PO₄)₄ lead(IV) phosphate
- i) Sn(CO₃)₂ tin(IV) carbonate
- j) Co(NO₃)₂ cobalt(II) nitrate

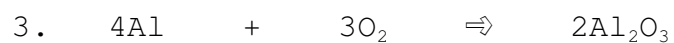
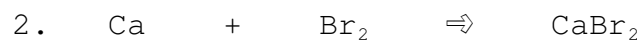
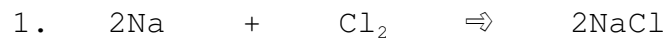
5. Mixed Problems!!!!

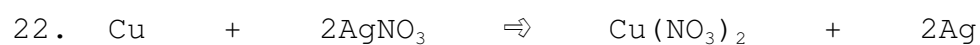
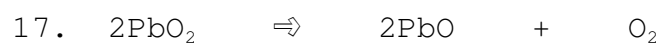
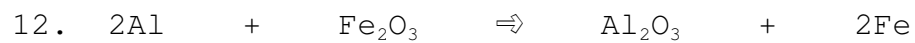
- a) CO₂ carbon(IV) oxide
- b) MgO magnesium oxide
- c) (NH₄)₃PO₄ ammonium phosphate
- d) Ag₂CO₃ silver carbonate
- e) V₂O₅ vanadium(V) oxide
- f) PbSO₄ lead(II) sulphate
- g) NaCl sodium chloride
- h) Mg(NO₃)₂ magnesium nitrate
- i) IrCl₃ iridium(III) chloride
- j) Pt₃(PO₄)₄ platinum(IV) phosphate

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Balancing Chemical Equations

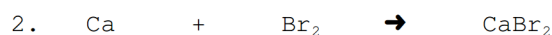
Balance each of the following chemical equations:





SCH 4C Balancing Quiz #1

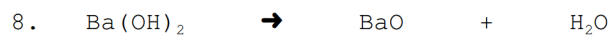
Balance each equation by adding stoichiometric coefficients before each compound or element. Use pencil!



Complete each synthesis reaction:



Complete each decomposition reaction:



Complete each single replacement reaction:

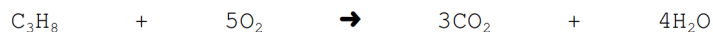


Complete each double replacement reaction:

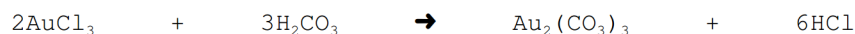


Write balanced chemical equations for each word description:

14. the combustion of the hydrocarbon propane with the chemical formula of C_3H_8



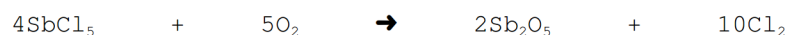
15. the double displacement reaction between gold(III) chloride with hydrogen carbonate



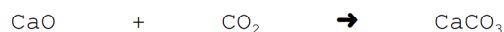
16. the decomposition of scandium sulphide



17. the single replacement reaction between antimony(V) chloride and oxygen gas



18. the synthesis of calcium carbonate from calcium oxide plus a common gas



SCH 4C Balancing Quiz #2

Balance each equation by adding stoichiometric coefficients before each compound or element. Use pencil!

1. $2\text{Hg}_2\text{O} \rightarrow 4\text{Hg} + \text{O}_2$
2. $\text{Mg} + \text{Cl}_2 \rightarrow \text{MgCl}_2$
3. $2\text{Se}_2\text{O}_5 + 25\text{Cl}_2 \rightarrow 10\text{SeCl}_5 + 5\text{O}_2$
4. $2\text{FeCl}_3 + 3\text{Na}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 6\text{NaCl}$
5. $2\text{C}_8\text{H}_{18} + 25\text{O}_2 \rightarrow 16\text{CO}_2 + 18\text{H}_2\text{O}$

Complete each synthesis reaction:

6. $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
7. $\text{Ga}_2\text{O}_3 + 3\text{H}_2\text{O} \rightarrow 2\text{Ga}(\text{OH})_3$

Complete each decomposition reaction:

8. $\text{K}_2\text{CO}_3 \rightarrow \text{K}_2\text{O} + \text{CO}_2$
9. $2\text{Ag}_3\text{N} \rightarrow 6\text{Ag} + \text{N}_2$

Complete each single replacement reaction:

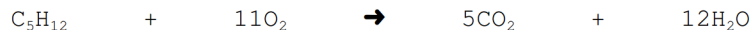
10. $2\text{Sc} + \text{Fe}_2\text{S}_3 \rightarrow \text{Sc}_2\text{S}_3 + 2\text{Fe}$
11. $2\text{Al}_2\text{O}_3 + 6\text{Br}_2 \rightarrow 4\text{AlBr}_3 + 3\text{O}_2$

Complete each double replacement reaction:

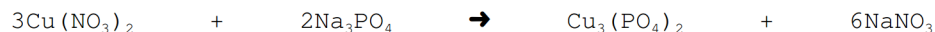
12. $\text{MgO} + \text{Ba}(\text{ClO}_3)_2 \rightarrow \text{Mg}(\text{ClO}_3)_2 + \text{BaO}$
13. $3(\text{NH}_4)_2\text{CO}_3 + 2\text{AlCl}_3 \rightarrow 6\text{NH}_4\text{Cl} + \text{Al}_2(\text{CO}_3)_3$

Write balanced chemical equations for each word description:

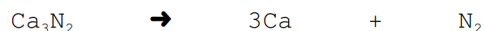
14. the combustion of the hydrocarbon pentane with the chemical formula of C_5H_{12}



15. the double displacement reaction between copper(II) nitrate with sodium phosphate



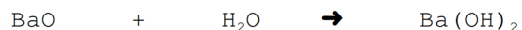
16. the decomposition of calcium nitride



17. the single replacement reaction between phosphorus(V) oxide and chlorine gas



18. the synthesis of barium hydroxide from barium oxide plus a common substance



Name: _____

SCH 4C
Stoichiometry Unit Test

1. Balance the following equations



2. Perform each unit conversion. Be sure to use complete and extended units:

a) convert 72.9 g of NH_3 to number of molecules of NH_3

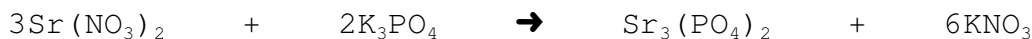
$$72.9 \text{ g NH}_3 \times \frac{1 \text{ mol NH}_3}{17.04 \text{ g NH}_3} \times \frac{6.022 \times 10^{23} \text{ molec NH}_3}{1 \text{ mol NH}_3} = 2.57 \times 10^{24} \text{ molec NH}_3$$

b) convert 8.79×10^{24} H atoms to the equivalent mass of CH_4

$$8.79 \times 10^{24} \text{ atoms H} \times \frac{1 \text{ molec CH}_4}{4 \text{ atoms H}} \times \frac{1 \text{ mol CH}_4}{6.022 \times 10^{23} \text{ molec CH}_4}$$

$$\times \frac{16.04 \text{ g CH}_4}{1 \text{ mol CH}_4} = 58.5 \text{ g CH}_4$$

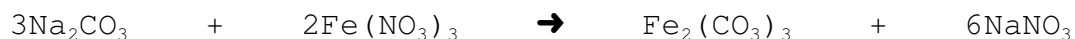
3. What mass of strontium nitrate is required to form 890.0 g of strontium phosphate?



$$890.0 \text{ g Sr}_3(\text{PO}_4)_2 \times \frac{1 \text{ mol Sr}_3(\text{PO}_4)_2}{452.80 \text{ g Sr}_3(\text{PO}_4)_2} \times \frac{3 \text{ mol Sr}(\text{NO}_3)_2}{1 \text{ mol Sr}_3(\text{PO}_4)_2}$$

$$\times \frac{211.64 \text{ g Sr}(\text{NO}_3)_2}{1 \text{ mol Sr}(\text{NO}_3)_2} = 1248 \text{ g Sr}(\text{NO}_3)_2$$

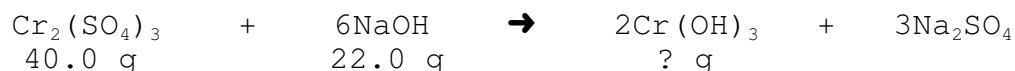
4. What amount of sodium carbonate is require to form 450.0 g of iron(III) carbonate



$$450.0 \text{ g Fe}_2(\text{CO}_3)_3 \times \frac{1 \text{ mol Fe}_2(\text{CO}_3)_3}{291.73 \text{ g Fe}_2(\text{CO}_3)_3} \times \frac{3 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol Fe}_2(\text{CO}_3)_3}$$

$$= 4.63 \text{ mol Na}_2\text{CO}_3$$

5. What is the maximum possible mass of chromium(III) hydroxide that can form from 40.0 g of chromium(III) sulphate and 22.0 g of sodium hydroxide



$$40.0 \text{ g Cr}_2(\text{SO}_4)_3 \times \frac{1 \text{ mol Cr}_2(\text{SO}_4)_3}{392.21 \text{ g Cr}_2(\text{SO}_4)_3} \times \frac{2 \text{ mol Cr}(\text{OH})_3}{1 \text{ mol Cr}_2(\text{SO}_4)_3}$$

$$\times \frac{103.03 \text{ g Cr}(\text{OH})_3}{1 \text{ mol Cr}(\text{OH})_3} = 21.0 \text{ g Cr}(\text{OH})_3$$

$$22.0 \text{ g NaOH} \times \frac{1 \text{ mol NaOH}}{40.00 \text{ g NaOH}} \times \frac{2 \text{ mol Cr}(\text{OH})_3}{6 \text{ mol NaOH}}$$

$$\times \frac{103.03 \text{ g Cr}(\text{OH})_3}{1 \text{ mol Cr}(\text{OH})_3} = 18.9 \text{ g Cr}(\text{OH})_3$$

therefore the maximum possible mass of chromium(III) hydroxide that can form is 18.9 g Cr(OH)₃

6. Determine the concentration of each of the following solutions:

a) 550 mL of a solution that contains 0.025 mol of HCl

$n = 0.025 \text{ mol HCl}$ $C = ?$ $V = 550 \text{ mL} \rightarrow 0.550 \text{ L}$	$C = \frac{n}{V}$ $C = \frac{0.025 \text{ mol}}{0.550 \text{ L}}$ $C = 0.0455 \text{ mol/L}$ $C = 0.0455 \text{ M}$
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b) 750 mL of a solution that contains 0.025 g of HCl

$n = 0.025 \text{ g HCl} \times \frac{1 \text{ mol HCl}}{36.46 \text{ g HCl}} = 0.000686 \text{ mol HCl}$ $C = ?$ $V = 750 \text{ mL} \rightarrow 0.750 \text{ L}$	$C = \frac{n}{V}$ $C = \frac{0.000686 \text{ mol}}{0.750 \text{ L}}$ $C = 0.000914 \text{ mol/L}$ $C = 0.000914 \text{ M}$
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c) 4.0 L of a solution of sulphuric acid made through the dilution of 25 mL of 12.0 M H_2SO_4

$C_S = 12.0 \text{ M}$ $V_S = 25 \text{ mL} \rightarrow 0.025 \text{ L}$ $C_D = ?$ $V_D = 4.0 \text{ L}$	$C_D = \frac{C_S \times V_S}{V_D}$ $C_D = \frac{12.0 \text{ M} \times 0.025 \text{ L}}{4.0 \text{ L}}$ $C_D = 0.075 \text{ M}$
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7. Determine the mass of Na_2CO_3 required to make 4.0 L of 0.1 M sodium carbonate solution.

$n = ?$ $C = 0.1 \text{ M}$ $V = 4.0 \text{ L}$	$n = CV$ $n = 0.1 \frac{\text{mol}}{\text{L}} \times 4.0 \text{ L}$ $n = 0.4 \text{ mol Na}_2\text{CO}_3$ $0.4 \text{ mol Na}_2\text{CO}_3 \times \frac{105.99 \text{ g Na}_2\text{CO}_3}{1 \text{ mol Na}_2\text{CO}_3} = 42.4 \text{ g Na}_2\text{CO}_3$
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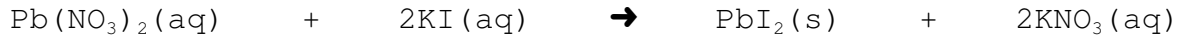
8. Determine the concentration of solution that would result if 45.0 g of NaHCO_3 is dissolved in 1.0 L of water. What will this concentration become if 4.0 L of water is added?

$n = 45.0 \text{ g NaHCO}_3 \times \frac{1 \text{ mol NaHCO}_3}{84.01 \text{ g NaHCO}_3} = 0.536 \text{ mol NaHCO}_3$ $C = ?$ $V = 1.0 \text{ L}$	$C = \frac{n}{V}$ $C = \frac{0.536 \text{ mol}}{1.0 \text{ L}}$ $C = 0.536 \text{ mol/L}$ $C = 0.536 \text{ M}$
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Adding 4.0 L of water to 1.0 L increases the total volume to 5.0 L. There is no change in amount. Therefore

$n = 0.536 \text{ mol NaHCO}_3$ (see above) $C = ?$ $V = 5.0 \text{ L}$	$C = \frac{n}{V}$ $C = \frac{0.536 \text{ mol}}{5.0 \text{ L}}$ $C = 0.107 \text{ mol/L}$ $C = 0.107 \text{ M}$
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9. What is the maximum possible amount of lead(II) iodide precipitate that could form from the reaction of 500 mL of 0.25 M lead(II) nitrate mixed with 400 mL of 0.30 M potassium iodide?



consider $\text{Pb}(\text{NO}_3)_2$

$n = ?$ $C = 0.25 \text{ M}$ $V = 500 \text{ mL} \rightarrow 0.500 \text{ L}$	$n = CV$ $n = 0.25 \frac{\text{mol}}{\text{L}} \times 0.500 \text{ L}$ $n = 0.125 \text{ mol}$
$0.125 \text{ mol Pb}(\text{NO}_3)_2 \times \frac{1 \text{ mol PbI}_2}{1 \text{ mol Pb}(\text{NO}_3)_2} = 0.125 \text{ mol PbI}_2$	

consider KI

$n = ?$ $C = 0.30 \text{ M}$ $V = 400 \text{ mL} \rightarrow 0.400 \text{ L}$	$n = CV$ $n = 0.30 \frac{\text{mol}}{\text{L}} \times 0.400 \text{ L}$ $n = 0.12 \text{ mol}$
$0.12 \text{ mol KI} \times \frac{1 \text{ mol PbI}_2}{2 \text{ mol KI}} = 0.06 \text{ mol PbI}_2$	

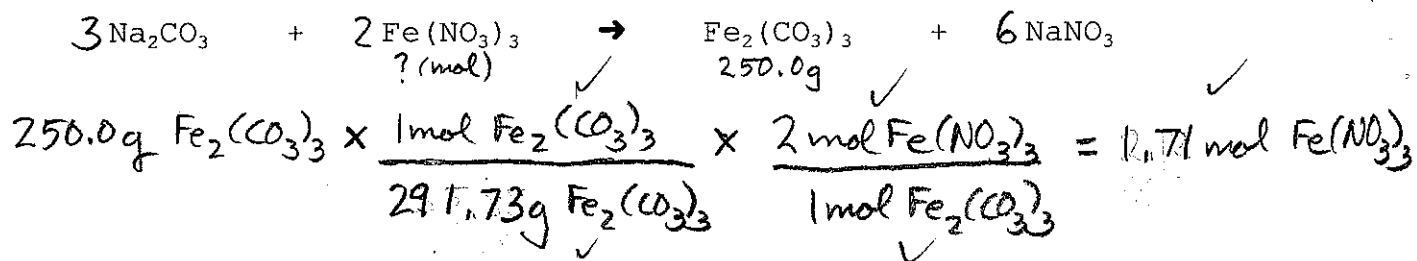
therefore the maximum possible amount of lead(II) iodide is 0.06 mol PbI_2

BONUS: Determine the concentration of potassium ion in p.p.m. for 250 mL of solution that contains a mass of 0.0015 g of K_2CO_3

$$\frac{0.0015 \text{ g K}_2\text{CO}_3}{250 \text{ mL}} \times \frac{1 \text{ mol K}_2\text{CO}_3}{138.21 \text{ g K}_2\text{CO}_3} \times \frac{2 \text{ mol K}^{1+}}{1 \text{ mol K}_2\text{CO}_3} \times \frac{39.10 \text{ g K}^{1+}}{1 \text{ mol K}^{1+}}$$

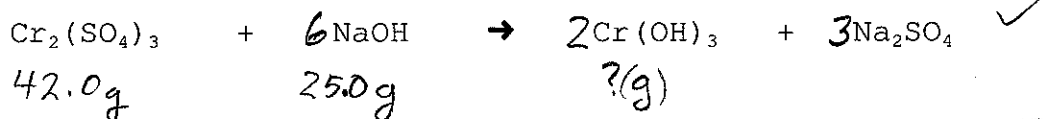
$$\times \frac{1000 \text{ mg}}{1 \text{ g}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = \frac{3.395 \text{ mg K}^{1+}}{1 \text{ L}} \rightarrow 3.395 \text{ p.p.m. K}^{1+} \text{ ion}$$

4. What amount of iron (III) nitrate is required to form 250.0 g of iron(III) carbonate



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5. What is the maximum possible mass of chromium(III) hydroxide that can form from 42.0 g of chromium(VI) sulphate and 25.0 g of sodium hydroxide



Consider $\text{Cr}_2(\text{SO}_4)_3$

$$42.0\text{g Cr}_2(\text{SO}_4)_3 \times \frac{1\text{mol Cr}_2(\text{SO}_4)_3}{392.21\text{g Cr}_2(\text{SO}_4)_3} \times \frac{2\text{mol Cr}(\text{OH})_3}{1\text{mol Cr}_2(\text{SO}_4)_3} \times \frac{103.03\text{g Cr}(\text{OH})_3}{1\text{mol Cr}(\text{OH})_3} = 22.1\text{g Cr}(\text{OH})_3$$

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Consider NaOH

$$25.0\text{g NaOH} \times \frac{1\text{mol NaOH}}{40.00\text{g NaOH}} \times \frac{2\text{mol Cr}(\text{OH})_3}{6\text{mol NaOH}} \times \frac{103.03\text{g Cr}(\text{OH})_3}{1\text{mol Cr}(\text{OH})_3} = 21.5\text{g Cr}(\text{OH})_3$$

$\therefore 21.5\text{g Cr}(\text{OH})_3$ is the maximum possible mass of $\text{Cr}(\text{OH})_3$ / NaOH is the limiting reagent

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6. Determine the concentration of each of the following solutions:

a) 750 mL of a solution that contains 0.015 mol of HCl

$$n = 0.015 \text{ mol HCl}$$

$$C = \frac{n}{V} \quad \checkmark$$

$$\checkmark C = ? \text{ (M)}$$

$$C = \frac{0.015 \text{ mol HCl}}{0.750 \text{ L}} \quad \checkmark$$

$$V = 750 \text{ mL} \rightarrow 0.750 \text{ L} \quad \checkmark$$

$$C = 0.02 \text{ M HCl} \quad \checkmark$$

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b) 650 mL of a solution that contains 0.045 g of HCl

$$n = 0.045 \text{ g HCl} \times \frac{1 \text{ mol HCl}}{36.46 \text{ g HCl}} = 0.00123 \text{ mol HCl}$$

$$C = ? \text{ (M)}$$

$$V = 650 \text{ mL} \rightarrow 0.650 \text{ L} \quad \checkmark$$

$$C = \frac{n}{V} \quad \checkmark$$

$$C = 0.00190 \text{ M HCl} \quad \checkmark$$

$$C = \frac{0.00123 \text{ mol HCl}}{0.650 \text{ L}} \quad \checkmark$$

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c) 5.0 L of a solution of sulphuric acid made through the dilution of 55 mL of 12.0 M H_2SO_4

$$C_s = 12.0 \text{ M}$$

$$C_D = \frac{C_s V_s}{V_D} \quad \checkmark$$

$$\checkmark V_s = 55 \text{ mL} \rightarrow 0.055 \text{ L} \quad \checkmark$$

$$\checkmark C_D = ?$$

$$C_D = \frac{12.0 \text{ M} \times 0.055 \text{ L}}{5.0 \text{ L}}$$

$$V_D = 5.0 \text{ L}$$

$$C_D = 0.132 \text{ M} \quad \checkmark$$

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7. Determine the mass of Na_2CO_3 required to make 2.0 L of 0.25 M sodium carbonate solution.

$$n = ?$$

$$C = 0.25 \text{ M } \text{Na}_2\text{CO}_3$$

$$V = 2.0 \text{ L} \quad \checkmark$$

$$n = CV \quad \checkmark$$

$$n = \frac{0.25 \text{ mol } \text{Na}_2\text{CO}_3}{1 \text{ L}} \times 2.0 \text{ L}$$

$$n = 0.50 \text{ mol } \text{Na}_2\text{CO}_3 \quad \checkmark$$

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$$0.50 \text{ mol } \text{Na}_2\text{CO}_3 \times \frac{105.99 \text{ g } \text{Na}_2\text{CO}_3}{1 \text{ mol } \text{Na}_2\text{CO}_3} = 53.0 \text{ g } \text{Na}_2\text{CO}_3$$

8. Determine the concentration of solution that would result if 85.0 g of NaHCO_3 is dissolved in 1.5 L of water. What will this concentration become if 8.0 L of water is added?

$$n = 85.0 \text{ g } \text{NaHCO}_3 \times \frac{1 \text{ mol } \text{NaHCO}_3}{84.01 \text{ g } \text{NaHCO}_3} = 1.01 \text{ mol } \text{NaHCO}_3$$

$$C = ?$$

$$V = 1.5 \text{ L} \quad \checkmark$$

$$C = \frac{n}{V} \rightarrow C = \frac{1.01 \text{ mol } \text{NaHCO}_3}{1.5 \text{ L}} \rightarrow C = 0.675 \text{ M } \text{NaHCO}_3$$

$$C_s = 0.675 \text{ M}$$

$$V_s = 1.5 \text{ L} \quad \checkmark$$

$$C_D = ?$$

$$V_D = 1.5 \text{ L} + 8.0 \text{ L} = 9.5 \text{ L} \quad \checkmark$$

$$C_D = \frac{C_s V_s}{V_D} \quad \checkmark$$

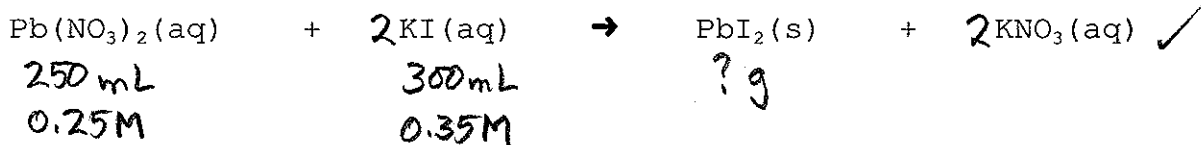
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$$C_D = \frac{0.675 \text{ M} \times 1.5 \text{ L}}{9.5 \text{ L}}$$

$$C_D = 0.107 \text{ M } \text{NaHCO}_3 \quad \checkmark$$

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9. What is the maximum possible mass of lead(II) iodide precipitate that could form from the reaction of 250 mL of 0.25 M lead(II) nitrate mixed with 300 mL of 0.35 M potassium iodide?



Consider
 $\text{Pb(NO}_3)_2$

$$n = ?$$

$$n = CV \quad \checkmark$$

$$C = 0.25\text{ M} \quad \checkmark$$

$$n = 0.25\text{ mol/L} \times 0.250\text{ L}$$

$$V = 250\text{ mL} \rightarrow 0.250\text{ L}$$

$$n = 0.0625\text{ mol Pb(NO}_3)_2 \quad \checkmark$$

$$0.0625\text{ mol Pb(NO}_3)_2 \times \frac{1\text{ mol PbI}_2}{1\text{ mol Pb(NO}_3)_2} \times \frac{461.01\text{ g PbI}_2}{1\text{ mol PbI}_2} = 28.8\text{ g PbI}_2$$

Consider
KI

$$n = ?$$

$$n = CV$$

$$C = 0.35\text{ M} \quad \checkmark$$

$$n = 0.35\text{ mol/L} \times 0.300\text{ L}$$

$$V = 300\text{ mL} \rightarrow 0.300\text{ L}$$

$$n = 0.105\text{ mol KI} \quad \checkmark$$

$$0.105\text{ mol KI} \times \frac{1\text{ mol PbI}_2}{2\text{ mol KI}} \times \frac{461.01\text{ g PbI}_2}{1\text{ mol PbI}_2} = 24.2\text{ g PbI}_2$$

↑
limiting reagent

↑
maximum possible mass

BONUS: Determine the concentration of potassium ion in p.p.m. for 250 mL of solution that contains a mass of 0.0015 g of K_2CO_3



$$\frac{0.0015\text{ g K}_2\text{CO}_3}{250\text{ mL}} \times \frac{1\text{ mol K}_2\text{CO}_3}{138.21\text{ g K}_2\text{CO}_3} \times \frac{2\text{ mol K}^+}{1\text{ mol K}_2\text{CO}_3} \times \frac{39.10\text{ g K}^+}{1\text{ mol K}^+}$$

$$\times \frac{1000\text{ mg}}{1\text{ g}} \times \frac{1000\text{ mL}}{1\text{ L}} = \frac{3.395\text{ mg}}{1\text{ L}} \Rightarrow 3.395\text{ p.p.m.}$$

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