

SLE155 Chemistry for the Professional Sciences

Burwood and Geelong

Week 1 – Study Guide



A mole of oxygen, O_2 , and a mole of phosphorus, P_4 , do **not** contain the same number of molecules.

a. True

*b. False

The molar mass of elemental oxygen and oxygen gas are different.

- *a. True
- b. False

A mole of nitrogen gas, N_2 , and a mole of carbon dioxide gas, CO_2 , contain the same number of molecules.

- *a. True
- b. False

H₂O is both an empirical and molecular formula.

- *a. True
- b. False

100ml of a 0.5M solution of NaOH is used to neutralise 200ml of a 0.2M HCl solution. The limiting reagent is NaOH.

a. True

*b. False

A 0.540 molar aqueous solution of sodium tetrafluoroborate ($M = 109.79 \text{ g mol}^{-1}$) contains 14.82 grams of solute in 250 mL of solution.

- *a. True
- b. False

How many moles of Mg ($M_{\text{Mg}} = 24.305 \text{ g mol}^{-1}$) are there in a 3.50 g sample of this substance?

a. 0.0182 moles

*b. 0.144 moles

c. 0.218 moles

The atomic weight of helium is 4.0026 u. What is the mass of a helium sample which contains 0.427 moles of He gas?

- a. 0.427 g
- b. 0.107 g
- *c. 1.71 g
- d. 2.57 g
- e. 9.37 g

A sample of phosphorus trifluoride, PF_3 , contains 1.400 moles of the substance. How many atoms are there in the sample?

a. 4

b. 5.6

c. 8.431×10^{23}

d. 2.409×10^{24}

*e. 3.372×10^{24}

How many molecules of carbon dioxide are there in 154.0 grams of carbon dioxide?

a. 3.499

*b. 2.107×10^{24}

c. 4.214×10^{24}

d. 9.274×10^{25}

e. 4.081×10^{27}

What is the percent, by weight, of calcium in $\text{Ca}(\text{OCl})_2$? Use the atomic weights provided in your text.

a. 28.571

*b. 28.030

c. 31.562

d. 43.87

e. 44.493

A 7.300 gram sample of aluminum combined quantitatively with some selenium to form a definite compound. The compound weighed 39.35 grams. What is the empirical formula for this compound?

- a. AlSe
- b. Al_2Se
- *c. Al_2Se_3
- d. AlSe_2
- e. Al_3Se_2

A compound contains potassium, nitrogen, and oxygen. The experimental analysis gave values of 45.942% potassium and 16.458% nitrogen, by weight, the remainder is oxygen. What is the empirical formula of the compound?

- *a. KNO_2
- b. KNO_3
- c. $\text{K}_2\text{N}_2\text{O}_5$
- d. KN_3O_8
- e. $\text{K}_2\text{N}_2\text{O}$

Consider the balanced chemical equation, $\text{C}_3\text{H}_8 + 5 \text{O}_2 \rightarrow 3 \text{CO}_2 + 4 \text{H}_2\text{O}$. If 0.3818 moles of C_3H_8 and 1.718 moles of O_2 are allowed to react, and this is the only reaction which occurs, theoretically how many moles of water should be produced?

- *a. 1.374 moles
- b. 1.336 moles
- c. 1.527 moles
- d. 1.718 moles
- e. 3.426 moles

PI_3 ($M = 411.69 \text{ g mol}^{-1}$) and water ($M = 18.015 \text{ g mol}^{-1}$) react to form H_3PO_3 ($M = 81.996 \text{ g mol}^{-1}$) and HI ($M = 127.91 \text{ g mol}^{-1}$). If 0.5000 moles of phosphorus triiodide and 2.500 moles of water are used, what is the theoretical yield of hydrogen iodide?

- a. 63.96 g
- b. 205.8 g
- *c. 191.9 g
- d. 319.8 g
- e. 383.7 g

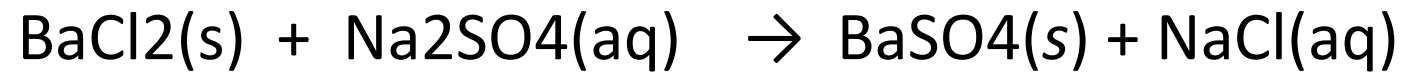
In a chemical reaction, $\text{AsF}_3 + \text{CCl}_4 \rightarrow \text{AsCl}_3 + \text{CCl}_2\text{F}_2$, the theoretical yield of CCl_2F_2 was calculated to be 1.68 moles. If the percent yield in the reaction was 74.3%, how many grams of CCl_2F_2 were obtained?

- a. 203 grams
- b. 167 grams
- *c. 151 grams
- d. 273 grams
- e. 303 grams

66.7 mL of 18.0 molar sulfuric acid solution was dissolved in enough water to make 500 mL of solution. The molarity of the diluted mixture is:

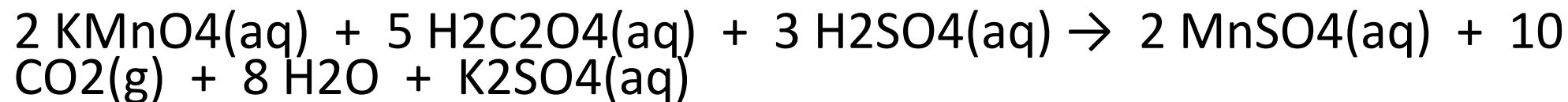
- *a. 2.40 molar
- b. 0.135 molar
- c. 36.0 molar
- d. 9.00 molar
- e. 0.00741 molar

How many mL of 0.200 molar Na₂SO₄(aq) solution are required to completely react with 3.23 grams of BaCl₂ (formula weight = 208.2) to form products as shown below?



- a. 0.0155 ml
- b. 0.0776 ml
- c. 15.5 ml
- d. 31.0 ml
- *e. 77.6 ml

How many mL of 0.446 molar $\text{KMnO}_4(\text{aq})$ are required to react with 50.0 mL of 0.200 molar $\text{H}_2\text{C}_2\text{O}_4(\text{aq})$ in the presence of excess $\text{H}_2\text{SO}_4(\text{aq})$? The reaction is:



- *a. 8.97 ml
- b. 17.9 ml
- c. 44.8 ml
- d. 55.8 ml
- e. 112 ml