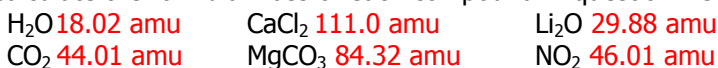


## Answers for Chapter 4 Study Questions

1. Calculate the formula mass of each compound in question #5



2. Complete these equalities:



3. Show the set-up including COMPLETE units (for example g H<sub>2</sub>O and mol H<sub>2</sub>O, not g and mol) for these calculations:

a) What is the mass in g of 4.00 moles of H<sub>2</sub>O?

b) If you weight out 17.43 g of MgCO<sub>3</sub> how many moles of MgCO<sub>3</sub> do you have?

c) What is the mass in g of 0.23 moles of CH<sub>4</sub>?

d) If you weight out 454 g of glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) how many moles of glucose do you have?

$$4.00 \text{ mol H}_2\text{O} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = \text{_____ g H}_2\text{O}$$

$$17.43 \text{ g MgCO}_3 \times \frac{1 \text{ mol MgCO}_3}{84.32 \text{ g MgCO}_3} = \text{_____ mol MgCO}_3$$

$$0.23 \text{ mol CH}_4 \times \frac{16.04 \text{ g CH}_4}{1 \text{ mol CH}_4} = \text{_____ g CH}_4$$

$$454 \text{ g glucose} \times \frac{1 \text{ mol glucose}}{180.1 \text{ g glucose}} = \text{_____ mol glucose}$$

4. Record the answer for each calculation in question #13 with complete units and the correct number of significant figures.

$$4.00 \text{ mol H}_2\text{O} \times \frac{18.02 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} = 72.1 \text{ g H}_2\text{O}$$

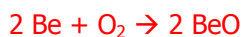
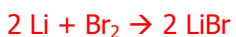
$$17.43 \text{ g MgCO}_3 \times \frac{1 \text{ mol MgCO}_3}{84.32 \text{ g MgCO}_3} = 0.2067 \text{ mol MgCO}_3$$

$$0.23 \text{ mol CH}_4 \times \frac{16.04 \text{ g CH}_4}{1 \text{ mol CH}_4} = 3.7 \text{ g CH}_4$$

$$454 \text{ g glucose} \times \frac{1 \text{ mol glucose}}{180.1 \text{ g glucose}} = 2.52 \text{ mol glucose}$$

5. Write a balanced equation for each of these reactions.

a) lithium reacts with bromine    b) beryllium reacts with oxygen    c) aluminum reacts with sulfur  
d) glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>) reacts with oxygen to form carbon dioxide and water



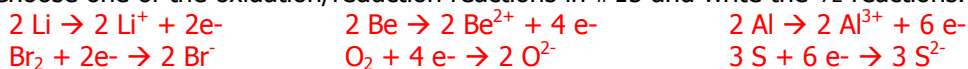
6. Which of the reactions in #15 are oxidation/reduction reactions? All

7. Tell which reactant is oxidized and which is reduced for each oxidation/reduction reaction in #15.

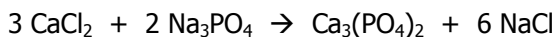
in a, b, and c the metal is oxidized and the nonmetal is reduced

the answer to this question is not simple for equation d. You could use oxidation states to see which atoms are reduced and which are oxidized.

8. Choose one of the oxidation/reduction reactions in #15 and write the  $\frac{1}{2}$  reactions.



9. Use this balanced equation to answer the questions below. Show the set-up with complete units for each calculation and report your answer with the correct number of significant figures.



a) What mass of sodium phosphate is required to react with 53.6 g of calcium chloride?

b) What mass of sodium chloride will be produced from 53.6 g of calcium chloride?

c) What mass of calcium chloride is required to produce 24.5 g of calcium phosphate?

molar masses (calculated by adding atomic masses)

$$1 \text{ mol CaCl}_2 = 111.0 \text{ g CaCl}_2$$

$$(1 \text{ mol PO}_4) = 94.97 \text{ g PO}_4$$

$$1 \text{ mol Na}_3\text{PO}_4 = 163.7 \text{ g Na}_3\text{PO}_4$$

$$1 \text{ mol NaCl} = 58.44 \text{ g NaCl}$$

$$1 \text{ mol Ca}_3(\text{PO}_4)_2 = 310.2 \text{ g Ca}_3(\text{PO}_4)_2$$

$$\text{a) } 53.6 \text{ g CaCl}_2 \times \frac{1 \text{ mol CaCl}_2}{111.0 \text{ g CaCl}_2} \times \frac{2 \text{ mol Na}_3\text{PO}_4}{3 \text{ mol CaCl}_2} \times \frac{163.7 \text{ g Na}_3\text{PO}_4}{1 \text{ mol Na}_3\text{PO}_4} = 52.7 \text{ g Na}_3\text{PO}_4$$

$$\text{b) } 53.6 \text{ g CaCl}_2 \times \frac{1 \text{ mol CaCl}_2}{111.0 \text{ g CaCl}_2} \times \frac{6 \text{ mol NaCl}}{3 \text{ mol CaCl}_2} \times \frac{58.44 \text{ g NaCl}}{1 \text{ mol NaCl}} = 56.4 \text{ g NaCl}$$

$$\text{c) } 24.5 \text{ g Ca}_3(\text{PO}_4)_2 \times \frac{1 \text{ mol Ca}_3(\text{PO}_4)_2}{310.2 \text{ g Ca}_3(\text{PO}_4)_2} \times \frac{3 \text{ mol CaCl}_2}{1 \text{ mol Ca}_3(\text{PO}_4)_2} \times \frac{111.0 \text{ g CaCl}_2}{1 \text{ mol CaCl}_2} = 26.3 \text{ g CaCl}_2$$