

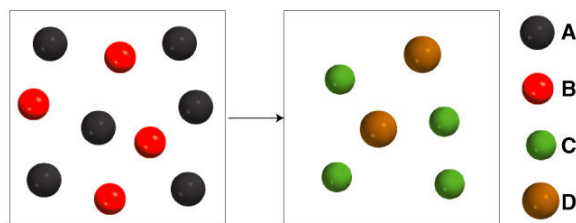
**Chapter 3 Practice Worksheet:  
Formulas, Equations, and Moles: Part I**

## 1) Balancing Equations

- a.  $\underline{2}$   $\text{N}_2\text{O}_5 \rightarrow \underline{2}$   $\text{N}_2\text{O}_4 + \underline{\quad}$   $\text{O}_2$
- b.  $\underline{2}$   $\text{CO} + \underline{\quad}$   $\text{O}_2 \rightarrow \underline{2}$   $\text{CO}_2$
- c.  $\underline{\quad}$   $\text{H}_2 + \underline{\quad}$   $\text{Br}_2 \rightarrow \underline{2}$   $\text{HBr}$
- d.  $\underline{2}$   $\text{K} + \underline{2}$   $\text{H}_2\text{O} \rightarrow \underline{2}$   $\text{KOH} + \underline{\quad}$   $\text{H}_2$
- e.  $\underline{2}$   $\text{Mg} + \underline{\quad}$   $\text{O}_2 \rightarrow \underline{2}$   $\text{MgO}$
- f.  $\underline{2}$   $\text{O}_3 \rightarrow \underline{3}$   $\text{O}_2$
- g.  $\underline{2}$   $\text{H}_2\text{O}_2 \rightarrow \underline{2}$   $\text{H}_2\text{O} + \underline{\quad}$   $\text{O}_2$
- h.  $\underline{\quad}$   $\text{N}_2 + \underline{3}$   $\text{H}_2 \rightarrow \underline{2}$   $\text{NH}_3$
- i.  $\underline{\quad}$   $\text{Zn} + \underline{2}$   $\text{AgCl} \rightarrow \underline{\quad}$   $\text{ZnCl}_2 + \underline{2}$   $\text{Ag}$
- j.  $\underline{\quad}$   $\text{S}_8 + \underline{8}$   $\text{O}_2 \rightarrow \underline{8}$   $\text{SO}_2$
- k.  $\underline{2}$   $\text{NaOH} + \underline{\quad}$   $\text{H}_2\text{SO}_4 \rightarrow \underline{\quad}$   $\text{Na}_2\text{SO}_4 + \underline{2}$   $\text{H}_2\text{O}$
- l.  $\underline{\quad}$   $\text{Cl}_2 + \underline{2}$   $\text{NaI} \rightarrow \underline{2}$   $\text{NaCl} + \underline{\quad}$   $\text{I}_2$
- m.  $\underline{3}$   $\text{KOH} + \underline{\quad}$   $\text{H}_3\text{PO}_4 \rightarrow \underline{\quad}$   $\text{K}_3\text{PO}_4 + \underline{3}$   $\text{H}_2\text{O}$
- n.  $\underline{\quad}$   $\text{CH}_4 + \underline{4}$   $\text{Br}_2 \rightarrow \underline{\quad}$   $\text{CBr}_4 + \underline{4}$   $\text{HBr}$

2) For the reaction on the right, which of the following equations **best** represents the reaction?

- a.  $\text{A} + \text{B} \rightarrow \text{C} + \text{D}$
- b.  $6\text{A} + 4\text{B} \rightarrow \text{C} + \text{D}$
- c.  $\text{A} + 2\text{B} \rightarrow 2\text{C} + \text{D}$
- d.  $3\text{A} + 2\text{B} \rightarrow 2\text{C} + \text{D}$
- e.  $3\text{A} + 2\text{B} \rightarrow 4\text{C} + 2\text{D}$



## 3) Calculate the molar masses of the following substances:

- a.  $\text{NO}_2$       **45.99 g/mol**
- b.  $\text{C}_6\text{H}_6$       **78.12 g/mol**
- c.  $\text{NaI}$       **149.89 g/mol**
- d.  $\text{CS}_2$       **76.14 g/mol**
- e.  $\text{Ca}_3(\text{PO}_4)_2$       **310.19 g/mol**
- f.  $\text{Li}_2\text{CO}_3$       **73.88 g/mol**
- g.  $\text{CHCl}_3$       **119.36 g/mol**

4) Stoichiometric Conversions: Complete the table below by converting between numbers of particles (atoms/molecules/formula units), moles, and grams.

Grams	Moles	# Atoms, Molecules, Particles
200.59 g Hg	1.00 mol Hg atoms	$6.02 \times 10^{23}$ Hg atoms
12.0 g C	1.00 mol C atoms	$6.02 \times 10^{23}$ C atoms
10.00 g H <sub>2</sub>	4.950 mol H <sub>2</sub>	$2.981 \times 10^{24}$ H <sub>2</sub> molecules
783 g CH <sub>4</sub>	49.0 mol CH <sub>4</sub>	$2.95 \times 10^{25}$ CH <sub>4</sub> molecules
2.00 g Mg(NO <sub>3</sub> ) <sub>2</sub>	$1.35 \times 10^{-2}$ mol Mg(NO <sub>3</sub> ) <sub>2</sub>	$8.12 \times 10^{21}$ Mg(NO <sub>3</sub> ) <sub>2</sub> formula units
88.0 g CO <sub>2</sub>	2.00 mol CO <sub>2</sub> molecules	$1.20 \times 10^{24}$ CO <sub>2</sub> molecules

5) Avogadro's Number and the Mole

a. How many oxygen atoms are in one molecule of H<sub>2</sub>O?

1 O atom

b. How many hydrogen atoms are in one molecule of H<sub>2</sub>O?

2 H atoms

c. How many molecules of H<sub>2</sub>O are in 1.0 grams of H<sub>2</sub>O?

$3.4 \times 10^{22}$  molecules

d. How many H atoms are in 1.0 grams of H<sub>2</sub>O?

$6.7 \times 10^{22}$  H atoms

e. How many atoms are in 3.14 g of copper (Cu)?

$2.97 \times 10^{22}$  Cu atoms

f. How many atoms are contained in 1.0 gram of CH<sub>4</sub>?

$1.9 \times 10^{23}$  atoms

g. How many ions are contained in 5.0612 grams of MgCl<sub>2</sub>?

$9.6028 \times 10^{22}$  ions

h. How many molecules of ethane (C<sub>2</sub>H<sub>6</sub>) are there in 0.334 g of ethane?

$6.69 \times 10^{21}$  molecules

i. The density of water reaches a maximum of 1.00 g/mL at 4°C. How many water molecules are there in 2.56 mL of water at 4°C?

$8.56 \times 10^{22}$  molecules