Today's Needs

- Periodic Table
- Calculator
- Whiteboard & Pen
- Notebook & pen/pencil

On Your Whiteboard

If your recipe for cornbread calls for 1.5 cups of flour to every 1 cup of cornmeal, how many cups of flour will you need if you want to use up the 3 cups of cornmeal you have?

Stoichiometry Part 1
Grams to Grams

Chemistry
Unit 8:
Stoichiometery
Lecture #1

Objectives

- Define and determine mole ratios from a balanced equation
- Use balanced chemical equations to determine the amount of a substance needed or produced from a given amount of another substance

Vocabulary

- Stoichiometry: Greek for “measuring elements”
- Proportions: comparative relationship between items (ratios)
- Mole Ratio: Ratio of one substance to another in a balanced chemical equation (comes from coefficients)

Big Idea

Balanced Equations are like “recipes”

- So long as we keep the *proportions* the same, we can “change” the amounts *without changing the recipe*

- In a balanced chemical equation, the coefficients give us the proportions
- As long as they remain proportional, the equation stays balanced!

Significance of a Balanced Equation

- The Coefficients give us the proportions (ratios)
- So long as the coefficients remain proportional, the equation stays balanced

Altering Chemical "Recipes"

$$2\ H_2 + O_2 \rightarrow 2\ H_2O$$

What if I change the "2" in front of H_2 to a "4"

What if I change the "1" in front of O_2 to a "6"

What if the "1" in front of O_2 was "6.022×10^{23}"

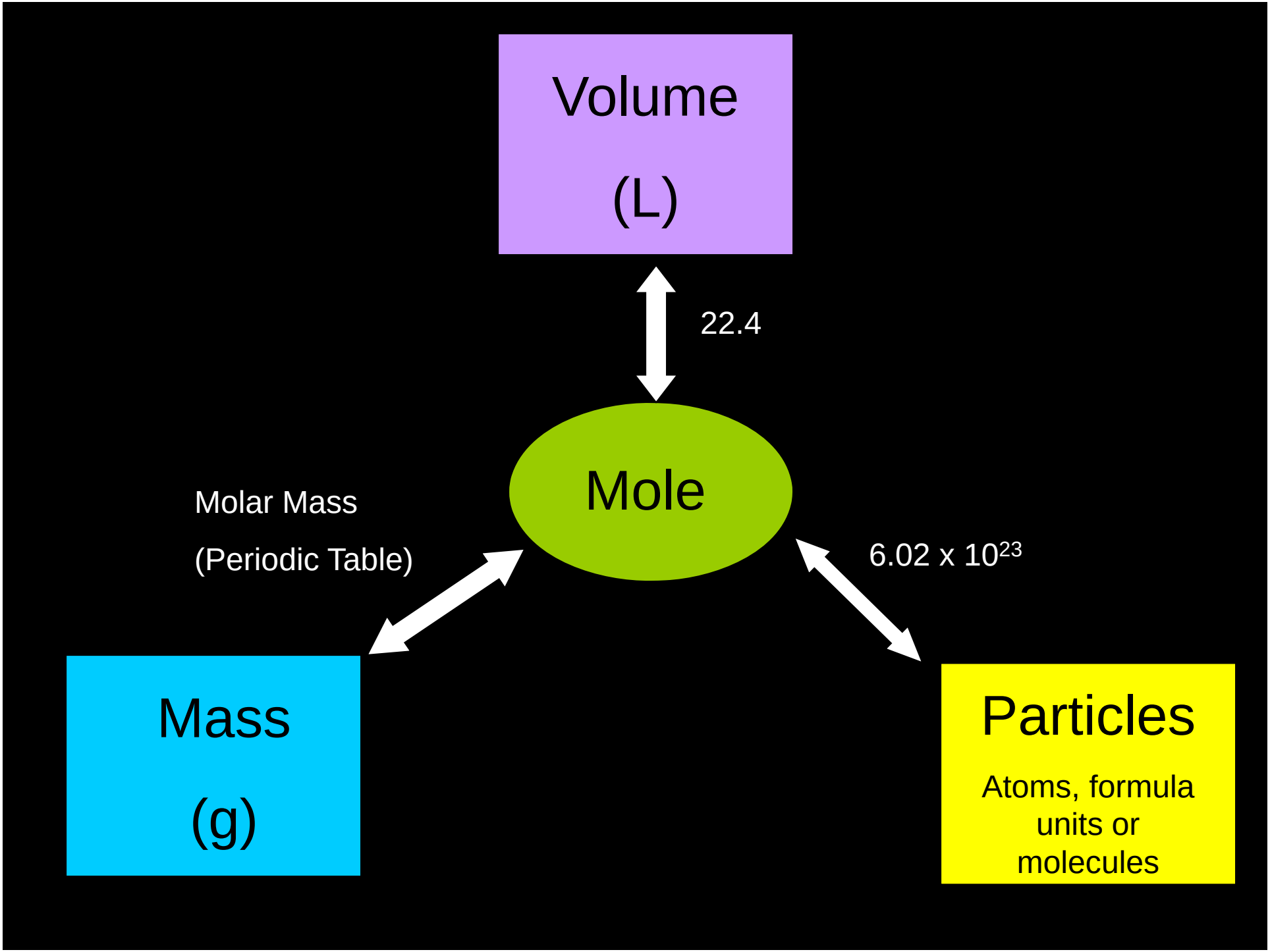
What if the "2" in front of H_2O was 14 L

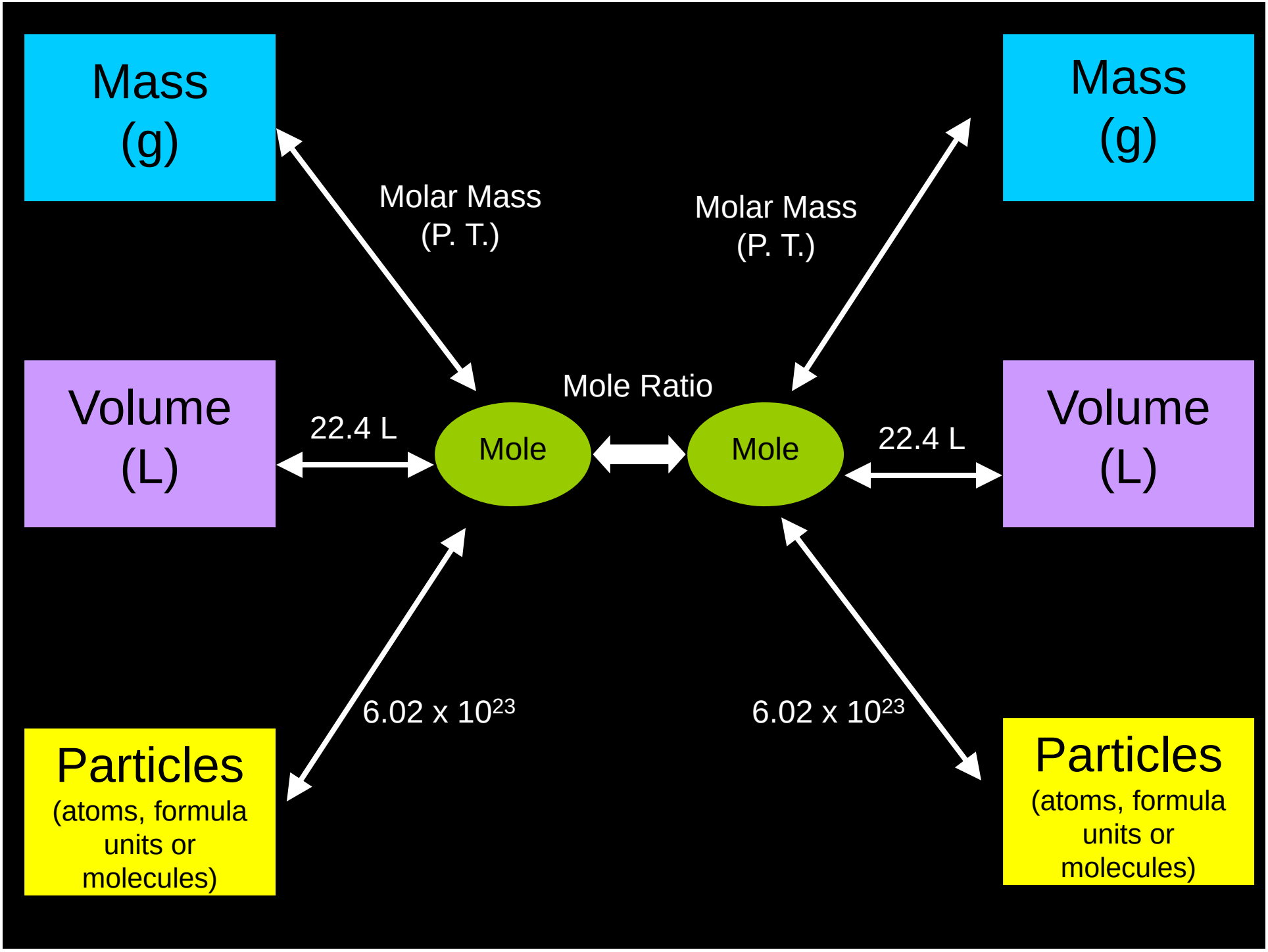
How many moles of H_2 will I need if I want to use up 15 moles of O_2 ?

Mole Ratios

$2\ Fe + 3\ CuSO_4 \rightarrow Fe_2(SO_4)_3 + 3\ Cu$

Ratio of Fe to $CuSO_4$:
Ratio of Fe to $Fe_2(SO_4)_3$:
Ratio of Fe to Cu
$CuSO_4$ / $Fe_2(SO_4)_3$:
$CuSO_4$ / Cu:
Fe2$(SO_4)_3$ / Cu:


Volume
(L)
22.4
Mole
Molar Mass
(Periodic Table)
6.02 x 10^23
Mass
(g)
Particles
Atoms, formula units or molecules

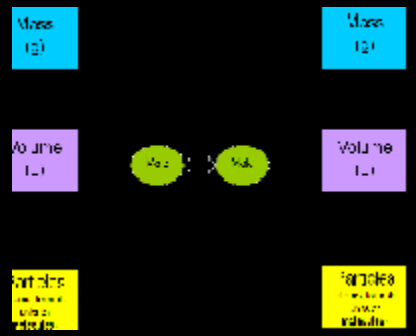

Mass (g)
Molar Mass (P. T.)
Molar Mass (P. T.)
Mass (g)
Volume (L)
22.4 L
Mole Ratio
Mole
Mole
22.4 L
Volume (L)
6.02 x 10^23
6.02 x 10^23
Particles (atoms, formula units or molecules)
Particles (atoms, formula units or molecules)

Steps to Stoichiometry

1. Make sure Equation is Balanced
2. Determine given substance, AND unit

   the unit helps you find your starting spot
3. Determine the wanted substance AND unit

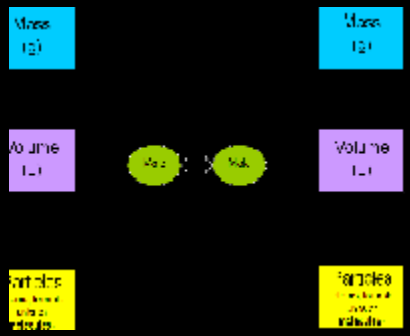
   the unit helps you find your ending spot
4. Plan your “route”. *Each leg needs a conversion factor (equality)*
5. Do the math!



Example

If 10.1 g of Iron are added to a solution of copper (II) sulfate, how much solid copper will form?

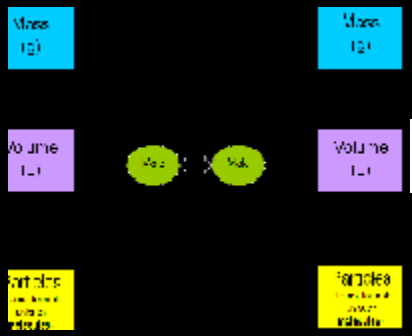
$$2\ Fe + 3\ CuSO_4 \rightarrow Fe_2(SO_4)_3 + 3\ Cu$$



Guided Practice

How much iron is needed to produce 15.0 g of copper when excess copper (II) sulfate is present?

$$2\ Fe + 3\ CuSO_4 \rightarrow Fe_2(SO_4)_3 + 3\ Cu$$



Independent Practice

How many grams of sodium chloride are produced fro 7.5 g of sodium and excess chloride?

$2\ Na + Cl_2 \rightarrow 2\ NaCl$

Write your summary and questions now