Stoichiometry

involves relating a quantity of substance A to a quantity of substance B.

Apr 16-11:16 AM

Before we start applying this concept to Chemistry, let's look at a real world application...

May 15-3:18 PM

Below is the **recipe** for a Garden Salad:

1 package of lettuce

2 whole tomatoes (chopped)

1.5 cucumbers

15 baby carrots

2 tsp chopped bacon

5 tsp Italian Dressing

feeds 6 people

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If I have 2 tomatoes, how many cucumbers do I need for the salad?

2 tomatoes

1.5 cucumbers

If I have 2 tsp bacon, how many tsp dressing do I need for the salad?

2 tsp bacon

5 tsp dressing

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Below is the **recipe** for a Garden Salad:

1 package of lettuce

2 whole tomatoes (chopped)

1.5 cucumbers

15 baby carrots

2 tsp chopped bacon

5 tsp Italian Dressing

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If I have 2 packages of lettuce, how many baby carrots do I need?

$$2 \text{ pkgs let} \times \frac{15 \text{ carrots}}{1 \text{ pkgs let}} = 30 \text{ carrots}$$

If I have 15 tsp of dressing, how many cucumbers do I need?

$$15 \text{ tsp dressing} \times \frac{1.5 \text{ cucumbers}}{5 \text{ tsp dressing}} = 4.5 \text{ cucumbers}$$

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ingredient list

When we are making food in a kitchen we follow a recipe.

When we are performing a chemical reaction in the lab we follow a balanced chemical equation.

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$$\underline{2}\ H_2 + \underline{1}\ O_2 \rightarrow \underline{2}\ H_2O$$

In chemistry, we get our ratios from a balanced chemical equation.

The coefficients tell us what amount of each substance we have.

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Coefficients are mole ratios

$$2\,H_2 + 1\,O_2 \rightarrow 2\,H_2O$$

2 moles of H_2	1 mole of O_2	2 moles of H_2O
2 molecules of H_2	1 molecule of O_2	2 molecules of H_2O
*2 liter of H_2	*1 liter of O_2	*2 liters of H_2O

* Liters can only be used if the substance is a GAS!

What is the mole ratio of O_2 to H_2O?

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We can use coefficient as the recipe amounts for a chemical equation.

$$2\,H_2 + 1\,O_2 \rightarrow 2\,H_2O$$

If I have 3.5 moles of H_2, how many moles of H_2O can I make?

given

Solve using Dimensional Analysis

Use coefficients from equation here!

$$3.5\ \text{moles } H_2 \times \frac{2\ \text{mol } H_2O}{2\ \text{mol } H_2} = 3.5\ \text{moles } H_2O$$

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