

Handout

Introduction: Compare mole ratios and other real-world ratio examples. You are encouraged to use words, drawings, different fonts, etc. to demonstrate your ideas.

A balanced chemical equation shows the quantitative relationships between each of the chemical species involved in a chemical reaction.

This means a balanced chemical equation can tell us the ratio of the number of moles of reactants to products taking part in a chemical reaction.

A balanced chemical equation provides important information:

1. Type and number of atoms and molecules that interact and how they arrange
2. The relative number of moles of atoms and molecules that interact and form

Example 1. Nitrogen gas and hydrogen gas react to form ammonia: $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightarrow 2\text{NH}_{3(g)}$

- The coefficients in the equation tell us that 1 mole of N_2 reacts with 3 moles of H_2 , forming 2 moles of NH_3 . This quantitative relationship can be written as a mole ratio:
$$1 \text{ mol N}_2 : 3 \text{ mol H}_2 : 2 \text{ mol NH}_3$$
- Mole ratios can be used to convert between amounts of any two substances in a chemical reaction.

Group Discussion: If we have 2 mol of N_2 , how many mol of H_2 is required to fully react if we are using the following equation, $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightarrow 2\text{NH}_{3(g)}$

Practice Problem: Using the following equation, $\text{N}_{2(g)} + 3\text{H}_{2(g)} \rightarrow 2\text{NH}_{3(g)}$, determine how many moles of H_2 would be needed to fully react with 3 mol of N_2 ?

Python Vocabulary:

- **print:** print() is one of the most basic Python functions as it allows us to display the result of the code we've written. The print() function literally prints (displays) the result to the screen. Usually something is needed inside the bracket. If there is data text, single or double quotes surround the data text, also referred to as a string. A string is combining multiple pieces of text.
- **Variables:** A variable is used to temporarily store data (text, numbers, etc.) in the memory of a computer. Ex. the price of a product or someone's name. Creating a variable is called 'declaring the variable'. You name your variable and assign a value to it but there are some rules:
 - You can use letters, digits, and underscores (_) in a variable name.
 - Variable names are case sensitive: example, Example, and eXampLe are all different variables as far as Python is concerned.
 - You can't start a variable name with a digit.
 - You can't use a reserved word (i.e. def, if, else, False, True, None...) as a variable name. If you're not sure what words are reserved (i.e. Python uses them for certain functions), type help('keywords') into your shell.
 - You assign a value to a variable using the equals sign (=). First comes the variable name, then the equals sign, then the value:
- **input:** input() is a function that allows us to get input from the user by showing a prompt. Examples include someone's name or their favourite number.
- **integer:** int() is a whole number that is positive or negative (ex. 10)
- **float:** a float() is a positive or negative number than contains a decimal (ex. 10.1)
- **String:** a str() a combination of multiple pieces of text

Python Brainstorming:

A large empty rectangular box intended for brainstorming notes.

