

Interpreting Formulas and Equations

Problem: What can you learn from formulas and equations?

Materials: Pencil and paper

Procedure:

1. A chemical formula shows the elements in a compound and the numbers of atoms of each element. The formula for carbon dioxide is CO_2 . The small number 2 is a subscript. Subscripts show how many atoms of each element have combined to form the compound. The carbon symbol does not have a written subscript. This means there is only one atom of carbon in the molecule.

2. Use the data tables shown below. In Table 1, write the number of atoms of each element for each of the compounds shown.

3. A chemical equation describes what happens in a chemical change. The equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ states that two molecules of hydrogen combine with a molecule of oxygen to make two molecules of water. The substances to the **left** of the arrow are called **reactants**. The substances to the **right** of the arrow are called **products**. The **arrow** means **yields** or produces. Notice the 2 in front of the H_2 , and H_2O . Numbers used in **front** of symbols and formulas are called **coefficients**. They are used to show the amounts of each substance in a reaction. A balanced chemical equation shows the same number of each kind of atom on both sides of the arrow. Coefficients are written in front of symbols and formulas in order to make the equation balanced. **Chemical equations must be balanced because atoms are never lost or gained in chemical change.**

4. In Table 2, write coefficients in the blanks to balance the equations. If the coefficient is 1, do not write it.

Data and Observations

Table 1

Formula	Number of hydrogen atoms	Number of carbon atoms	Number of oxygen atoms	Number of other atoms
H_2O_2				
CaCO_3				
$\text{NaC}_2\text{H}_3\text{O}_2$				
$\text{C}_3\text{H}_7\text{OH}$				
$\text{C}_{12}\text{H}_{22}\text{O}_{11}$				

Table 2

1. ___ H_2 + ___ N_2 \rightarrow ___ NH_3
2. ___ Mg + ___ HCl \rightarrow ___ MgCl_2 + ___ H_2
3. ___ H_2O_2 \rightarrow ___ H_2O + ___ O_2
4. ___ $\text{C}_6\text{H}_{12}\text{O}_6$ + ___ O_2 \rightarrow ___ CO_2 + ___ H_2O
5. ___ AgNO_3 + ___ NaCl \rightarrow ___ AgCl + ___ NaNO_3

Analysis

1. What information is in a formula? _____

2. What does a subscript tell? _____

3. What information can be obtained from a chemical equation?

4. What does a coefficient tell?

5. What are the reactants in equation 1?

6. What are the products in equation 4?

Conclusions and Applications

7. Why are word equations not used for chemical reactions?

8. Why is it important to use coefficients in chemical equations?
