

Chapter 6 Notes

Evidence for a Chemical Reaction:

1. Color Change
2. Formation of a Solid
3. Formation of a Gas (bubbles)
4. Absorption or release of heat
5. Production of a flame

CAUTION: many indicators of a chemical reaction can also indicate a physical change. Make sure you understand what is going on to determine if a chemical reaction is actually occurring.

REMEMBER: a chemical reaction has occurred if the substance at the beginning is not the same substance as the substance at the end.

Anytime a chemical change occurs it can be called a chemical reaction.

Chemical Reaction: a chemical change characterized by the rearrangement of the grouping of atoms.

Chemical Equation: a written representation of a chemical reaction.

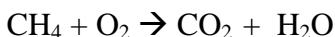
Reactants: the chemicals present before a chemical reaction takes place

Products: the chemicals present after a chemical reaction takes place

In a chemical equation reactants are located on the left, products on the right

In a chemical equation reactants and products are separated by an arrow that is read as yields or produces.

So if we react methane (CH₄) with oxygen to produce carbon dioxide and water we would show the equation:



This would be a very basic equation.

It does not show the states of matter of each chemical component.

States of matter are often included to give a more complete idea of exactly what is occurring.

States of matter are included behind each component in parenthesis.

The states of matter that occur most often in reactions are:

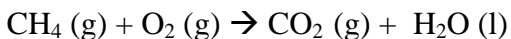
(s) = solid

(l) = liquid

(g) = gas

(aq) = aqueous solution, dissolved in water

So if we react methane gas (CH₄) with oxygen gas to produce carbon dioxide gas and liquid water we would show the equation:



This equation is still not complete. We are forgetting a major and important fact about chemical reactions:

IN A CHEMICAL REACTION ATOMS ARE NOT CREATED OR DESTROYED!

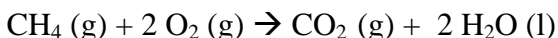
Unless an equation is labeled as being “unbalanced” meaning incomplete all equations should be balanced.

A balanced equation ensures that the number and types of atoms on the reactant side of the equation are the same as the number and types of atoms on the product side.

In order to balance a chemical equation we use **COEFFICIENTS**.

Coefficients are numbers (whole numbers) placed in front of a chemical to indicate the relative number present in the reaction.

The balanced equation for the above reaction would be:



When balancing an equation it is best to start by counting the number of each atom present on each side. Then look at your most complicated molecule and work from here to balance all atoms.

IMPORTANT: When balancing an equation you must **NEVER** change the chemicals present (can't change subscripts)

Be sure to check your work. There is no magic to balancing equations, just careful, thoughtful work.

A summary of the steps is provided on page 162 of the textbook.