Chemical Reactions

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Content Objective:

I can use the law of conservation of mass to write chemical equations.

Criteria for Success:

I can list four observations that a chemical reaction/chemical change has taken place.

I can list three requirements for a correctly written chemical equation.

I can write chemical equations given formulas, names, or particle representations of reactants and products.

Notes

Describing Changes

A. There are four easily observed changes that usually indicate that a chemical reaction has occurred:

1. The production of heat and light.
2. The production of a gas.
3. The formation of a precipitate which is a solid that is produced as a result of a chemical reaction in solution and that separates from the solution.
4. Change in color.

B. A chemical equation can be written to properly summarize any chemical change if the following three requirements are met:

1. The equation must represent known facts and include all reactants and products.
2. The equation must contain the correct formulas for the reactants and products.
   NOMENCLATURE WILL HAUNT YOU FOR THE REST OF YOUR LIFE!! REMEMBER diatomic elements!
3. The law of Conservation of Mass must be satisfied.
   a. This law states that mass (or matter) is neither created nor destroyed in ordinary chemical reactions.
   b. Mass of reactants MUST EQUAL mass of products

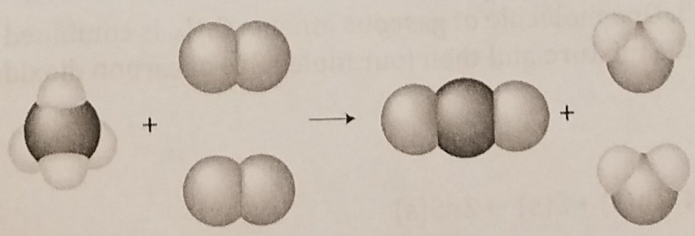
C. Chemical reactions can be described as a formula or word equation.

1. The following symbols are used to fully describe a chemical reaction and allow a chemist to meet the three requirements of writing a proper chemical equation.

→	forms, produces, yields
(s)	A reactant or product is in the solid state; also used to indicate a precipitate.
+	
(l)	A reactant or product is in the liquid state.
(g)	A reactant or product is in the gaseous state. vapor
(aq)	A reactant or product in an aqueous solution (dissolved in water).

heat →	Reactants are heated.
MnO_2 →	Formula of catalyst used to speed up reaction. The catalyst does NOT undergo permanent chemical change itself.
Δ →	The Greek letter delta above an arrow indicates the continuous addition of heat.

D. A particle representation also reflects the conservation of atoms by showing individual numbers of particles before and after reaction.



One methane molecule CH_4 ($\begin{pmatrix}1\,C\\4\,H\end{pmatrix}$) + Two oxygen molecules $2O_2$ ($(4\,O)$) → One carbon dioxide molecule CO_2 ($\begin{pmatrix}1\,C\\2\,O\end{pmatrix}$) + Two water molecules $2H_2O$ ($\begin{pmatrix}2\,O\\4\,H\end{pmatrix}$)