History of the Law of Conservation of Mass

Background Antoine Lavoisier was a French chemist who did most of his work between 1772-1786. He built a magnificent laboratory in Paris, France and invited scientists from around the world to come and visit. Lavoisier conducted numerous controlled experiments. He published two textbooks that helped organize chemistry into a comprehensible science. Based on his contributions to chemistry, Lavoisier is commonly known as the Father of Modern Chemistry. Lavoisier's most famous experiments involved the combustion of substances such as phosphorus, sulfur, and mercury. He proposed that air is composed of two parts, one of which combines with metals to form new products. This part was later named oxygen. Lavoisier believed that when a substance burns, oxygen from air combines with that substance to form a new substance. His experiments showed that the new product weighed more than the original substance by a mass equal to the amount of oxygen that reacted with the substance. These experiments led to what is currently known as The Law of Conservation of Mass. This law states that mass can neither be created nor destroyed. It can only be converted from one form to another. Initially, Lavoisier's conclusions were not accepted by the scientific world but they eventually led to a revolution in chemical thought. His work ultimately led to the basis of Dalton's Atomic Theory.

Directions Examine the data for each of the following combustion experiments and answer the questions based on analysis of the data.

EXPERIMENT #1

REACTANT(S) PRODUCT(S)

Magnesium + Oxygen ------> Magnesium Oxide

48.6 g + 32.0 g -----> 80.6 g

(1) a. What is the mass of each reactant? _____

b. What is the mass of the product? _____

c. What is the total mass of reactants? _____

d. Does this experimental data support the Law of Conservation of Mass? Explain.

_____

_____

EXPERIMENT #2 REACTANT(S) PRODUCT(S)

Magnesium + Oxygen ------> Magnesium Oxide

? g + 16.0 g -----> 40.3 g

(2) Based on the Law of Conservation of Mass, predict the minimum amount of magnesium that will react with all 16.0 grams of oxygen to produce 40.3 grams of magnesium oxide.

_____

EXPERIMENT #3 REACTANT(S) PRODUCT(S)

Magnesium + Oxygen ------> Magnesium Oxide

12.2 g + 8.0 g -----> ? g

(3) Assuming that magnesium and oxygen will react completely with one another, predict the mass of magnesium oxide that will be produced.

_____

EXPERIMENT #4 REACTANT(S) PRODUCT(S)

Magnesium + Oxygen ------> Magnesium Oxide + Oxygen

48.6 g + 50.0 g -----> 80.6 g + ?g

(4) Predict the mass of oxygen that will be left over after the reaction of 48.6 grams of magnesium with 50.0 grams of oxygen.

_____