

Answer Key for Chemical Reactions and Equations Note-taking Guide

Matter and Substances

elements, compounds, gas, substance, chemical reaction

Baking soda and vinegar undergo a chemical reaction to produce a gas.

Vinegar and baking soda are examples of compounds.

Vinegar and baking soda are made up of the elements carbon, hydrogen, and oxygen, but baking soda has sodium too.

Matter in the form of an element or a compound, is called a substance.

Identifying Substances

subscript, symbols, chemical formulas, hydrogen, periodic table, carbon, coefficient, sodium

Elements are represented by symbols on the periodic table.

H is the symbol for hydrogen and O is the symbol for oxygen. Na stands for sodium and C for carbon.

Compounds are represented by chemical formulas.

What information do you get from the chemical formula of water?

(Answers may vary). The chemical formula of water indicates that water is composed of one atom of oxygen and two atoms of hydrogen.

The chemical formula of water is H_2O . The number "2" in the formula is called the subscript.

Three molecules of water are represented as $3H_2O$.

The number "3" written before the chemical formula is called the coefficient.

How many atoms of hydrogen and oxygen make up three molecules of water?

(Answers may vary). Three molecules of water are composed of six atoms of hydrogen and three atoms of oxygen.

Chemical Reactions

chemical reaction, chemical equation, product, light, chemical, gas, color, energy, exothermic, reactants, endothermic

A chemical reaction occurs when different substances react chemically to form new substances.

The release of gas, production of heat and light, and a change in color and odor are some clues that can help us detect a chemical reaction.

During a chemical reaction, energy is either absorbed or released.

An exothermic reaction is one in which energy is released.

An endothermic reaction is one in which energy is absorbed.

Carbon and oxygen are substances that existed before the reaction started. They are known as reactants.

Carbon dioxide, which formed as a result of the reaction, is known as the product.

A chemical equation is a short and easy way to represent a chemical reaction using symbols.

What does the chemical equation " $C + O_2 \rightarrow CO_2$ " indicate?

(Answers may vary) This equation indicates that one carbon atom reacts with two oxygen atoms to form one molecule of carbon dioxide.

Law of Conservation of Mass

created, mass, equal, destroyed, conservation, products

The law of conservation of mass states that matter can neither be created nor destroyed in a chemical reaction and furthermore, the mass of the reactants is equal to the mass of the products.

When a piece of paper is burned, the ash left behind does not have the same mass as the original paper piece. What happened to the "missing mass"?

(Answers may vary) When the paper piece is burned, carbon dioxide gas and water vapor escape into the air and account for the "missing mass".

Balancing Chemical Reactions

equal, both sides, balanced, atoms, equation

Because matter can neither be created nor destroyed, chemical equations must be balanced. The number of atoms of each substance must be equal on both sides of the equation.

Hydrogen and oxygen combine to form water. A student represented this reaction using the following chemical equation: $\text{H}_2 + \text{O}_2 \square \text{H}_2\text{O}$

Why is this chemical equation incorrect?

(Answers may vary)The equation is incorrect because it is not balanced. There are two atoms of oxygen in the reactants and only one atom of oxygen in the product. This does not conform to the Law of Conservation of Mass.

How can you correct it? Write the correct equation.

(Answers may vary)The equation will be balanced by adding a coefficient '2', for hydrogen in the reactants side and a coefficient '2' for water in the product side.

The correct equation is: $2\text{H}_2 + \text{O}_2 \square 2\text{H}_2\text{O}$.

Balance the following chemical equations:

1. $\text{N}_2 + \underline{3} \text{H}_2 \rightarrow \underline{2} \text{NH}_3$
2. $\underline{4} \text{Al} + \underline{3} \text{O}_2 \rightarrow \underline{2} \text{Al}_2\text{O}_3$

Safety Review

When working with chemicals or an open flame during an investigation, which of the following pieces of safety and/or emergency equipment should you use or be prepared to use in case of emergency? Circle all that applies and be prepared to justify your choices.

beakers, safety goggles, triple beam balance, apron, gloves, metric ruler, stopwatch, eyewash/face wash station, graduated cylinders, fire blanket, spring scales, fire extinguisher
