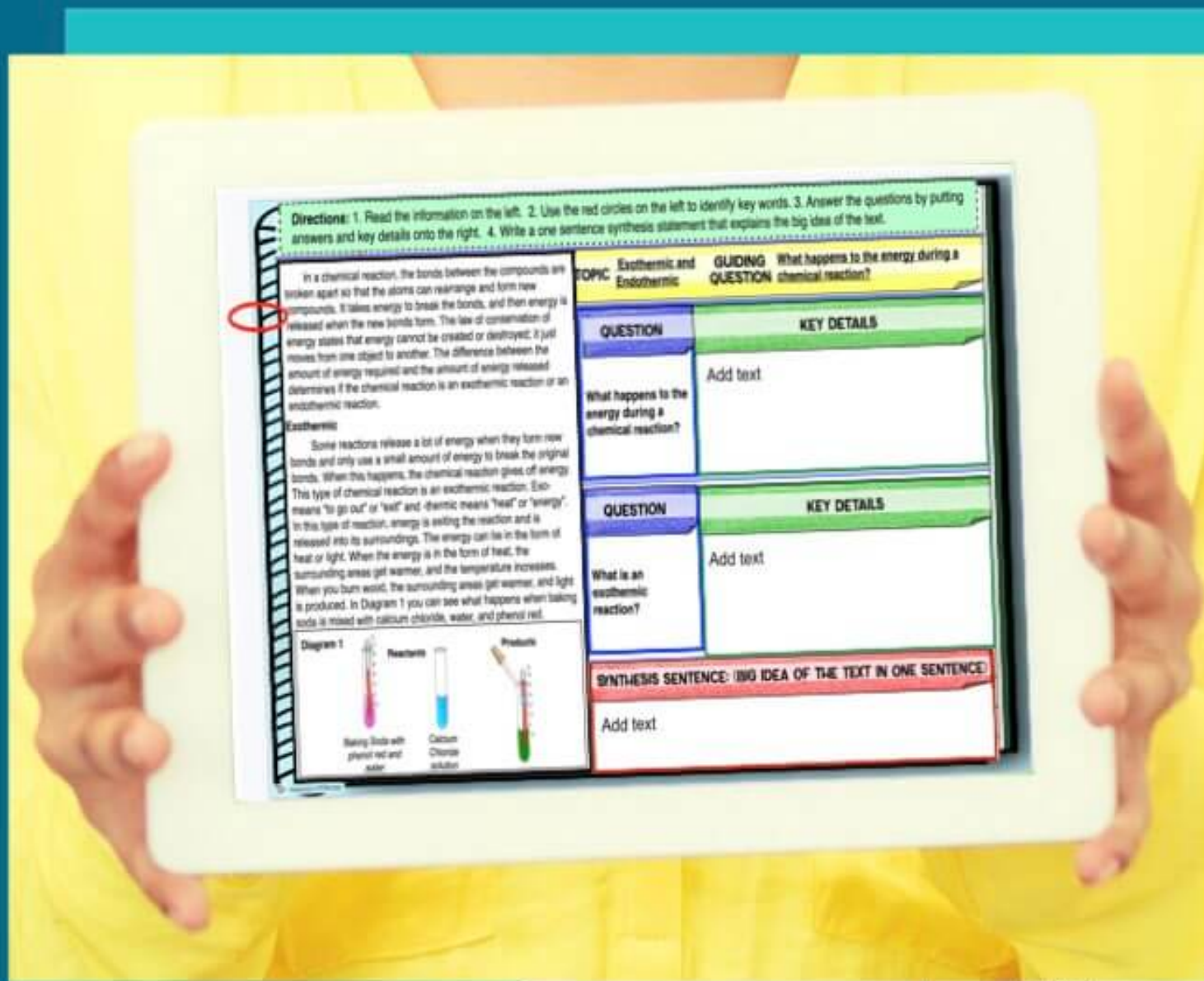


Chemical Reactions Reading



3 comprehension passages
3 Guided Note templates
worksheets

Physical vs. Chemical Change

Big Idea: What is a chemical change and how do you know one has occurred?

Have you ever popped popcorn in a microwave and left it on for too long? When this happens you get a distinct smell and the popcorn at the bottom looks black. This is because a chemical reaction has occurred.

Diagram 1



Corn kernels being heated for 2 minutes to create popcorn is a physical change, the substance is

Corn kernels being heated for 5 minutes to create popcorn will burn some of the kernels

Physical Change vs. Chemical Change

There is a main difference between physical and chemical change. Physical change is when you place water molecules they are just in a different state. Chemical change actually changes and turns into a new substance. For example, longer corn (diagram 1). The oxygen combine with a lot of carbon. Odor and a color change are

Evidence of a chemical change

Diagram 1

Evidences of a chemical change include energy change, color change, gas production, odor change, and precipitation.

There are many evidences between substances and reactions. These evidences during a chemical reaction are:

- **Energy Change:** The temperature increases or decreases.
- **Odor formation:** A new odor is produced.
- **Change in color:** The substances change to different colors.
- **Gas formation:** Bubbles are produced, more than this can be seen.
- **Precipitate:** When two liquids are mixed, a solid is formed. Example of a chemical reaction.

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Exothermic and Endothermic

Big Idea: What happens to the energy during a chemical reaction?

In a chemical reaction the bonds between the compounds are broken apart so that the atoms can rearrange and form new compounds. It takes energy to break the bonds and then energy is released when the new bonds form. The law of conservation of energy states that energy cannot be created or destroyed it just moves from one object to another. The difference between the amount of energy required and the amount of energy released determines if the chemical reaction is an exothermic reaction or an endothermic reaction.

Exothermic

Some reactions release a lot of energy when they form new bonds. This type of chemical reaction is an exothermic reaction. It releases "heat" or "energy". In this type of reaction energy is released into the surroundings. The energy can be in the form of heat, light, or sound. The surrounding areas get warmer. For example, when baking soda is mixed with vinegar.

Diagram 1

During photosynthesis energy, in the form of light, is absorbed by the reaction. The plant gets colder because the leaves absorb the light from the sun to produce glucose.

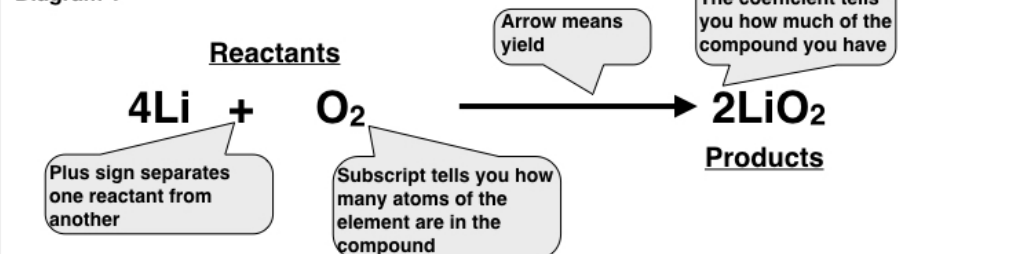
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Short passages with Guided Notes

Chemical Reaction?

Chemical reactions involve breaking and joining of atoms through a rearrangement of the molecules of the chemicals being mixed. They are represented by chemical equations. The number of atoms before the reaction is equal to the number of atoms after the reaction. In a chemical equation you need to show the reactants and the products (diagram 1). You start with the reactants and the products are what you end with. Similar to an equal sign, scientists use an arrow, also known as a yield sign, to separate the reactants from the products. As you write your chemical equation it is important to check your chemical symbols. Small differences could make a big difference. For example, CO, Co, and CO₂ look very similar but they are different things. CO is carbon monoxide, while Co is the element cobalt, and CO₂ is carbon dioxide.

Diagram 1



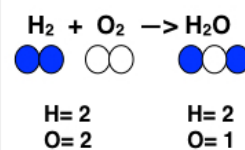
Balancing Chemical Equations

The law of conservation of mass states that mass can not be created or destroyed. This requires the total mass of the reactants to match the total mass of the products. This can be shown through a balanced equations where the total number of atoms for each element on the reactants side matches the total number of atoms for each element on the product side. To make sure your chemical equation is balanced you need to follow a few steps (diagram 2). 1. Count the number of atoms for each element on the reactant side and product side by multiplying the subscript by the coefficient. If the number of atoms on the reactant side does not match the number of atoms on the product side for each element, you need to add coefficients to the compound the uneven atoms are located in. Adding coefficients adds more of the compound. Do this until it is balanced. You can not change the subscript to balance an equation. If you change the subscript you change the compound itself. For example, in the equation $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$ you can not balance it by changing the H_2O to H_2O_2 . This changes the compound from water to hydrogen peroxide.

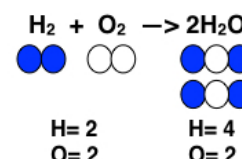
Diagram 2

How to balance the equations for $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$

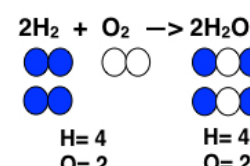
1. Count the number of atoms for each element on the reactant side and the product side



2. Add a coefficient to the water compound on the product side to change the 1 atom of oxygen to 2 atoms of oxygen. Then count and check again.



3. Add a coefficient to the hydrogen compound on the reactant side to change the 2 atoms of hydrogen to 4 atoms of hydrogen. Then count and check again.



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Directions: Follow the directions on each slide to complete this guided reading activity notebook

CHEMICAL REACTIONS

1

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

Have you ever popped popcorn in a microwave and left it on for too long? When the popcorn gets a distinct smell and the sound of the popcorn turns back. This is because a chemical reaction has occurred.

TOPIC: Chemical Change **GUIDING QUESTION:** What is a chemical change and how do you know one has occurred?

QUESTION: How is a chemical change different from a physical change?

KEY DETAILS: Add text

QUESTION: What is a chemical change?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

2

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

Evidence of a Chemical Change

TOPIC: Chemical Change **GUIDING QUESTION:** What is a chemical change and how do you know one has occurred?

QUESTION: What are the evidences of a chemical reaction?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

3

Directions: 1. Answer the questions on the left. 2. Place the labels on the left into the correct area to compare and contrast physical and chemical change. 3. Fill in the table by describing the evidence as put the correct picture on the right onto the examples.

What is a chemical change?

QUESTION: Describe the different evidences of a chemical change and then drag the pictures on the right to the correct evidence under examples.

Evidence	Description	Example
Energy Change	Add text	
Color Formation	Add text	
Color Change	Add text	
Precipitate	Add text	
Gas Formation	Add text	

4

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

In a chemical reaction the bonds between the compounds are broken apart so that the atoms can rearrange and form new compounds. A large amount of energy is released when the new bonds form. The law of conservation of energy states that energy cannot be created or destroyed but it can be transferred from one object to another. The difference between the amount of energy required and the amount of energy released determines if the chemical reaction is an endothermic reaction or an exothermic reaction.

TOPIC: Exothermic and Endothermic **GUIDING QUESTION:** What happens to the energy during a chemical reaction?

QUESTION: What happens to the energy during a chemical reaction?

KEY DETAILS: Add text

QUESTION: What is an exothermic reaction?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

5

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

Endothermic

Other reactions absorb a small amount of energy when they break new bonds but require a large amount of energy to break the original bonds. When they happen the chemical reaction absorbs energy. This type of chemical reaction is an endothermic reaction. Endo means "in" and thermo means "heat" or "energy". In this type of reaction energy is taken in and absorbed from its surroundings. The energy can be in the form of heat or light. When the energy is in the form of heat the surrounding areas get colder and the temperature decreases. When you're taking cold medicine the temperature goes colder because the energy is being absorbed by the medicine. Diagram 2 shows how plants absorb the light from the sun to convert it to glucose.

TOPIC: Exothermic and Endothermic **GUIDING QUESTION:** What happens to the energy during a chemical reaction?

QUESTION: What is an endothermic reaction?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

6

Directions: 1. Answer the questions on the left. 2. Use the red circles on the right to identify if the picture is showing an exothermic reaction or an endothermic reaction. 3. Answer the question at the bottom.

What is the definition of conservation of mass?

Use the circles on the right to identify if the picture shows an exothermic or endothermic reaction.

What happens to the energy?

Exothermic	Endothermic
Add text	Add text

What happens to the temperature?

Exothermic	Endothermic
Add text	Add text

When you mix water, copper chloride, and aluminum foil together the container gets really hot and steam comes off the liquid. What type of reaction is this and how do you know?

Add text

7

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

In a chemical reaction the bonds between the compounds are broken apart so that the atoms can rearrange and form new compounds. Stoichiometry shows the balancing and joining of atoms through a chemical equation. Chemical equations show the formulas of the chemicals involved. They are used to determine the conservation of mass showing the number of atoms before the reaction is equal to the number of atoms after the reaction.

TOPIC: Chemical Equations **GUIDING QUESTION:** What happens to the energy during a chemical reaction?

QUESTION: What does a chemical equation show?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

8

Directions: 1. Read the information on the left. 2. Use the red circles on the left to identify key words. 3. Answer the questions by putting answers and key details onto the left. 4. Write a one sentence synthesis statement that explains the big idea of the text.

Balancing Chemical Equations

The law of conservation of mass states that mass cannot be created or destroyed. This requires that the total mass of the reactants is equal to the total mass of the products. This can be shown through a chemical equation where the total number of atoms for each element on the reactant side matches the total number of atoms for each element on the product side. To make sure your chemical equation is balanced you need to follow a few steps (Diagram 1). 1. Count the number of atoms for each element on the reactant side and product side by making the subscript by the coefficient. 2. If the number of atoms on the reactant side does not match the number of atoms on the product side for each element, you need to add coefficients to the compound the atoms are unbalanced. Adding coefficients adds more of the compound. 3. Do this until it's balanced. This never changes the subscript to balance an equation. For example, in the equation $H_2 + O_2 \rightarrow H_2O$ you cannot balance it by changing the H_2O to H_2O_2 . This changes the compound from water to hydrogen peroxide.

TOPIC: Chemical Equations **GUIDING QUESTION:** What happens to the energy during a chemical reaction?

QUESTION: What is the law of conservation of mass?

KEY DETAILS: Add text

QUESTION: How do you balance a chemical equation?

KEY DETAILS: Add text

SYNTHESIS SENTENCE: (BIG IDEA OF THE TEXT IN ONE SENTENCE) Add text

9

Directions: 1. Answer the questions on the left. 2. Use the labels on the right to correctly identify the parts of the equation. 3. Balance the equations at the bottom.

What is the definition of conservation of mass?

Use the labels on the right to correctly identify the parts of the equation.

Balance the Equations and show your work by filling in the boxes with the correct information.

Beginning	Balanced Equation
$AgCl \rightarrow Ag + Cl_2$ $H_2 + O_2 \rightarrow H_2O$ $Fe + O_2 \rightarrow Fe_2O_3$	$2H_2 + O_2 \rightarrow 2H_2O$ $2Fe + 1.5O_2 \rightarrow Fe_2O_3$

Labels: Coefficient, Subscript, Yield, Product

10

Directions: 1. Answer the questions

Reactant As a whole add, Reactant
 Product As a whole add, Product
 Coefficient A number in front of a chemical formula
 Subscript A number below a chemical formula
 Yield A number after an arrow
 Product A chemical formula after an arrow

Is the equation below balanced?
 If it is not, balance the equation.
 $C_2H_6 + O_2 \rightarrow H_2O + CO_2$

Add text

11

Directions: 1. Answer the questions

When balancing chemical equations, why aren't you allowed to change the subscripts in the chemical formulas?

What are the similarities and differences between the two pictures below?

Add text

12

Digital or Print

Name: _____ Class: _____

Topic: Chemical Equations Date: _____

Big Idea Question: What happens to the energy during a chemical reaction?

Questions

Notes

What does a chemical equation show?

What is the law of conservation of mass?

How do you balance a chemical equation?



Summary:

Physical vs. Chemical Change

Define:

1. What is a chemical change? _____

Describe: Evidence of a chemical change

Evidence	Description	Example
Energy Change		
Odor Formation		
Color Change		
Precipitate		
Gas Formation		

Compare: Physical Change vs. Chemical Change

Physical Change

Exothermic and Endothermic

Define:

1. What is the definition of conservation of energy? _____

Describe:

	Exothermic	Endothermic
What happens to the energy?		
What happens to the temperature?		

Identify: Look at the pictures below and identify the reaction.



fire

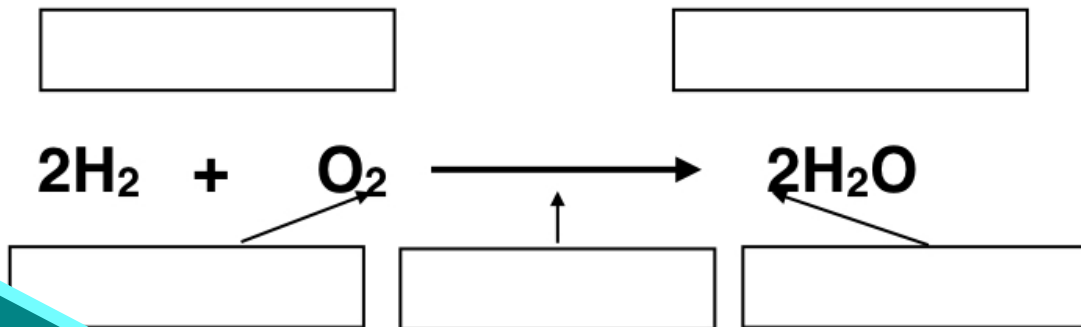
Exothermic

Chemical Equations

Define:

1. What is the definition of conservation of mass? _____

Identify: Look at the equation below. Label the coefficient, subscript, yield sign, reactants, and products.



Beginning:



N=

H=



C=

H=

O=

Balanced Equation



Unbalanced Equation



Comprehension Worksheets with answer key

When balancing chemical equations, why aren't you allowed to change the subscripts in the chemical formula?

the equation below balanced?
It is not balanced. The equation.
 $H_2O + CO_2$

Extension Task Cards

What are the differences and similarities between the two pictures?



white solid, Reactant with a temperature they mix the product in color, and the

temperature is 19°C. Did a chemical reaction occur? explain



Teaching STEM Through Inquiry

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