

CHEMICAL AND PHYSICAL CHANGES OF MATTER

Chemical Changes

A **chemical change** is a change in which one kind of substance is changed into a different kind of substance. Chemical changes produce substances that were not there when you started. You can't reverse or undo a chemical change. For example, burning a log is an example of a chemical change: once you burn a log, you can't "unburn" it or reconstruct it from its ashes.

Examples of chemical changes include:

1. rusting metal
2. digesting food
3. spoiled

Chemical



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Chemical Event	Starting Material/Item	Final Product/Item
car rusting	steel	rust
burning paper	paper	ash
frying an egg	raw egg	cooked egg

Possible Signs a Chemical Change Has Taken Place:

- ☞ a change in color
- ☞ a change in the substance's temperature
- ☞ light is given off
- ☞ a gas is produced
- ☞ a change in smell
- ☞ a change in taste (*Warning: do not taste anything during a science experiment.*)

Lesson Checkpoint: What is a chemical change? Give one example of a chemical change.

Physical Changes

A **physical change** is when matter undergoes a change that does not affect its physical make up. Physical changes involve an object's physical properties such as size, shape, color, and weight. The substance or object involved is the same before and after the change (unlike a chemical change). The change is not permanent and can be undone.

Examples of physical changes:

1. an ice cube melting
2. a piece of paper cut into two pieces
3. a crushed can

Physical Changes

Physical Event	Change/Item
grass being cut	physical change
glass broken	change
butter being melted	change



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Signs a Physical Change Has Taken Place:

- ☞ change of shape
- ☞ change of state (solid, liquid, or gas)
- ☞ change in size
- ☞ change in any other physical property

Lesson Checkpoint: What is a physical change? Give one example of a physical change.

Physical VS Chemical Changes: Which Is Which?

Physical Changes	Chemical Changes
A paper towel is ripped in half.	Milk goes sour.
A ball of clay is molded into a square.	A silver ring tarnishes.
A stick is snapped in half.	Bread is toasted.
Stirring cake batter.	Dead leaves and grass clippings turn into compost.

Chemical Reactions

Keep in mind: all matter is made of atoms, which may combine to form molecules

A chemical reaction occurs when one or more substances change into different substances with different physical and chemical properties. The substances that take part in the reaction are called reactants and the substances that are formed are called products.

For example, when a candle is lit, the wax and oxygen in the air react to form carbon dioxide and water. Another example is the rusting of iron.



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Words to know when dealing with chemical reactions:

A **reactant** is a substance used in a chemical reaction. The **product** is a substance made during a chemical reaction.

A **chemical equation**:

$\text{reactant} + \text{reactant} = \text{product}$
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Lesson Checkpoint: What is a chemical reaction?

Types of Chemical Reactions:

1. **Decomposition reaction** is the process of a complex substance being split up into simpler substances.

General formula to explain a decomposition reaction: $AB \rightarrow A + B$

2. **Synthesis reaction** is the process of two or more simple substances combining to form a more complex one.

General formula for a synthesis reaction: $A + B = AB$

☞ Decomposition and synthesis reactions are opposites.

3. **Combustion reaction** is when all substances in a compound are combined with oxygen, which then produces carbon dioxide and water.

So the equation is
 $A + B + O_2 \rightarrow$

Because the reaction produces
carbon dioxide.



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