

Chapter 2

The Properties of Matter



Chemical Properties Presentation

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Chapter 2

The Properties of Matter



Section 1: What Is Matter? REVIEW

Section 2: Physical Properties REVIEW

Section 3: Chemical Properties

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Section 1

What Is Matter?



2.1 Objectives REVIEW

- **Describe** the two properties of all matter.
- **Identify** the units used to measure volume and mass.
- **Compare** mass and weight.
- **Explain** the relationship between mass and inertia.

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Section 1

What Is Matter?



- **Describe** the two properties of all matter.
 - Mass: the amount of matter in an object
 - Volume: the amount of space an object occupies
- **Identify** the units used to measure volume and mass.
 - Mass: grams (g) [measured on a balance]
 - Volume: liters (L), cubic meters (cm^3) [measured in a graduated cylinder OR calculated after measuring dimensions or using the water displacement method]
- **Compare** mass and weight.
 - Weight is a measure of the gravitational force exerted on an object. An object's mass does not change on the moon, it's weight decreases to 1/6 of it's weight on Earth.
- **Explain** the relationship between mass and inertia.
 - Inertia is the tendency of an object to resist a change in motion. Object's with more mass have more inertia.

Section 2

Physical Properties



2.2 Objectives REVIEW

- **Identify** six examples of physical properties of matter.
- **Describe** how density is used to identify substances.
- **List** six examples of physical changes.
- **Explain** what happens to matter during a physical change.

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Section 2

Physical Properties



- **Identify** six examples of physical properties of matter.
 - state, density, thermal conductivity (rate at which it transfers heat), solubility (ability to dissolve), ductility (ability to be pulled into a wire), malleability (ability to be shaped into thin sheets)
- **Describe** how density is used to identify substances.
 - Density is a characteristic property. It is always the same for any amount of a particular substance (at a given temperature and pressure).
- **List** six examples of physical changes.
 - State change (freezing, melting, evaporating, condensing), crushing, dissolving, cutting, shaping, bending
- **Explain** what happens to matter during a physical change.
 - The identity of the substance does not change.

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Section 3

Chemical Properties



2.3 Objectives

- **Describe** two examples of chemical properties.
- **Explain** what happens during a chemical change.
- **Distinguish** between physical and chemical changes.

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Section 3

Chemical Properties



Chemical Properties

- Physical properties are easy to observe. Chemical properties, however, are not as easy to observe.
 - For example, you can see that wood is flammable only while it is burning. You have to cause a chemical change to identify a chemical property, then you don't have the original substance anymore.
- The properties that are most useful in identifying a substance are characteristic properties. These properties are always the same no matter what size the sample is.
 - Physical characteristic properties: density, solubility
 - Chemical characteristic properties: flammability, reactivity

Section 3

Chemical Properties



Chemical Changes and New Substances

- A chemical change/reaction happens when one or more substances are changed into new substances that have new and different properties.
- **Signs of Chemical Changes**
 - change in color or odor, production of heat, fizzing and foaming, and sound or light being given off
- **Matter and Chemical Changes** Chemical changes change the identity of the matter involved. Most would be hard to reverse (baked cake). Some chemical changes can be reversed by more chemical changes (water being split with electric current).

Section 3

Examples of Chemical Changes



The **hot gas** formed when hydrogen and oxygen join to make water helps blast the space shuttle into orbit.



Soured milk smells bad because bacteria have formed new substances in the milk.



Effervescent tablets bubble when the citric acid and baking soda in them react in water.



The **Statue of Liberty** is made of orange-brown copper but it looks green from the metal's interaction with moist air. New copper compounds formed and these chemical changes made the statue turn green over time.

Section 3

Chemical Properties



Physical Versus Chemical Changes

- **A Change in Composition**
 - Physical changes do not change the composition of a substance (they are still made of the same atoms/molecules-have the same chemical formulas). But chemical changes alter the composition of a substance.
- **Reversing Changes**
 - Many physical changes are easily reversed. But composition does change in a chemical change. So, most chemical changes are not easily reversed.

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Section 3

Chemical Properties



- **Describe** two examples of chemical properties.
 - flammability (ability to burn)
 - reactivity
- **Explain** what happens during a chemical change.
 - One or more substances change into new substances with new and different properties
- **Distinguish** between physical and chemical changes.
 - Physical changes: state change (freezing, melting, evaporating, condensing), crushing, dissolving, cutting, shaping, bending
 - Chemical changes: rusting, milk souring, cake baking, tablets effervescing, glow sticks glowing