

**Lesson Objectives**

By the end of this lesson, you should be able to:

- Describe elements as **pure** substances.
- Describe compounds as pure substances.
- Describe mixtures.

**Science Practice:** Classify matter as pure substances or mixtures by studying their **properties**.

**Words to Know**

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

- |                                |   |
|--------------------------------|---|
| <u>B</u> pure substance        | A. a method of separating solutions in which the solute is separated by the density or size of particles                        |
| <u>D</u> mixture               | B. a type of matter that cannot be broken down into simpler components without undergoing a chemical change                     |
| <u>A</u> chromatography        | C. a pure substance made up of only one type of atom  |
| <u>C</u> element               | D. a combination of pure substances that are not chemically combined  |
| <u>H</u> heterogeneous mixture | E. a pure substance made up of two or more elements that are chemically combined  |
| <u>E</u> compound              | F. a process in which a mixture is separated using differences in boiling point between the different components of the mixture |
| <u>F</u> distillation          | G. a mixture whose components cannot be distinguished and that appears as a single phase  |
| <u>G</u> homogeneous mixture   | H. a mixture whose components can be distinguished  |

## Instruction

## Elements, Compounds, and Mixtures

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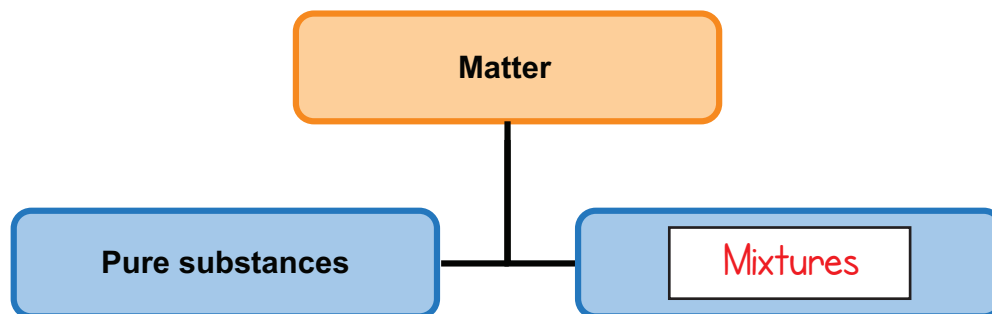
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## Lesson Question

What is everything on Earth made of?

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## Classification of Matter



## Pure Substances

A **pure substance** is a type of **matter** that cannot be broken down into simpler components without undergoing a chemical change.

Examples:

- Water (H<sub>2</sub>O)
- **Salt** (NaCl)

## Examples of Elements

An **element** is a pure substance consisting of only one type of atom.

Examples:

- Sodium (Na)
- Chlorine (**Cl**)
- **Iron** (Fe)
- Oxygen (O<sub>2</sub>)

## Instruction

## Elements, Compounds, and Mixtures

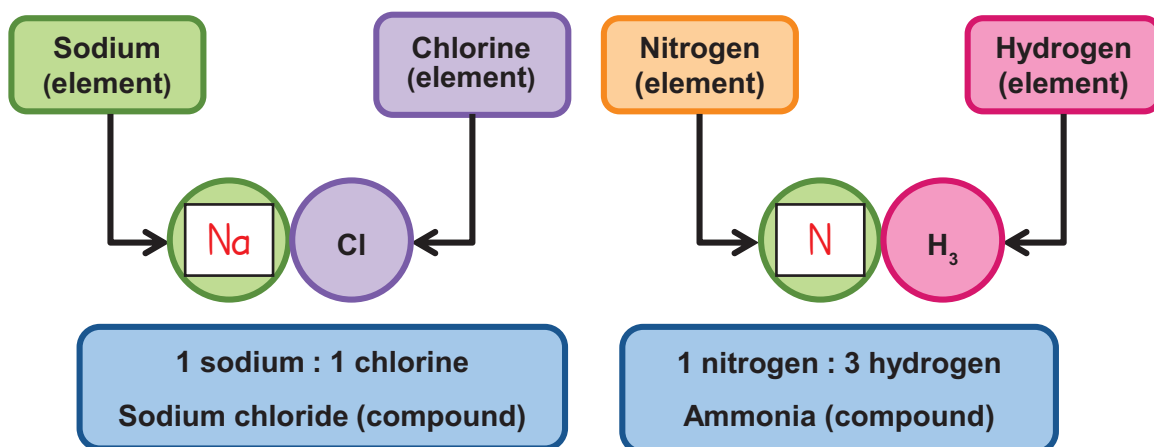
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**Compounds**

A **compound** is a pure substance made up of two or more different kinds of **atoms**.

- Atoms cannot be separated through physical processes.
- Atoms are bonded together chemically in a **fixed** ratio.

**Formation of Compounds****Examples of Compounds**

Examples:

- Water (**H<sub>2</sub>O**)
- Salt (NaCl)
- Emerald (Be<sub>3</sub>Al<sub>2</sub>(SiO<sub>3</sub>)<sub>6</sub>)
- **Rust** (Fe<sub>2</sub>O<sub>3</sub>)

## Instruction

## Elements, Compounds, and Mixtures

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**Mixtures**

A **mixture** is a combination of two or more **pure** substances that are not chemically combined.

- Can be separated by **physical** means
- Does not have fixed **ratios** between components

**Types of Mixtures**

A **homogeneous mixture** appears as a **single** phase.

- Salt water

A **heterogeneous mixture** appears to consist of two or more components that are distinguishable.

- **Soil**

**Examples of Mixtures**

Examples:

- Salt water
- Soil
- **Tea**
- Steel
- Air

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### Separation of Mixtures

Separations use physical methods only.

- Sorting

- **Filtration**



### Separation of Mixtures

**Distillation** is a process in which a mixture is separated using the differences in **boiling** points of the different components of the mixture.

Example:

- Separation of gasoline from other oil components



# Summary

## Elements, Compounds, and Mixtures



### Lesson Question

What is everything on Earth made of?



### Answer

(Sample answer) Matter is classified as elements, compounds, and mixtures. The simplest form among the three is element. Compounds are formed by the elements. Mixture is a fixed combination of compounds and can be separated by physical methods.

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### Pure Substances

- Matter can be divided into pure substances and mixtures.
- Pure substances are either **elements** or compounds.
- Elements are made up of only one type of atom.
- Compounds are made up of elements that are chemically combined.

### Mixtures

- Mixtures are made up of pure substances that are not **chemically** combined.
- Components of a mixture are not present in a fixed ratio.
- Mixtures are either homogeneous or heterogeneous.
- Most materials are mixtures.

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**Separation of Mixtures**

- Physical changes and processes can be used to separate mixtures.
- Physical properties of pure substances are used to determine how to separate a mixture.
- Sorting, filtration, **evaporation**, distillation, chromatography, and magnetism are common methods used to separate mixtures.

*Use this space to write any questions or thoughts about this lesson.*