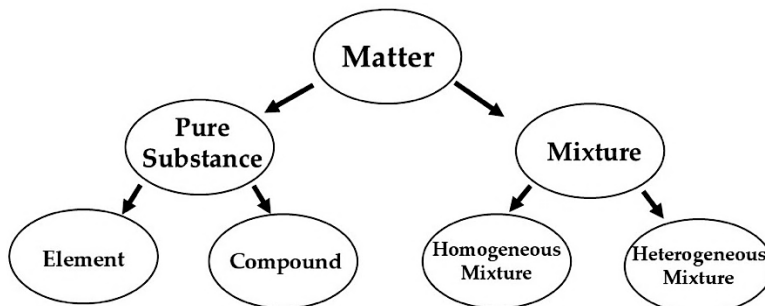


## Classification of Matter

Read from **Lesson 1: Matter and Its Classification** in the **Chemistry Tutorial Section, Chapter 2 of The Physics Classroom**:  
 Part a: [Solids, Liquids, and Gases](#)      Part b: [Mixtures vs. Pure Substances](#)

Matter can be classified into the following categories based on similar characteristics.



A **pure substance** cannot be broken down into simpler substances by physical changes. It can only be broken down by chemical changes.

An **element** is made up of a single type of atom. (An **atom** is the smallest unit of an element that maintains the chemical identity.)

A **compound** is two or more elements chemically combined.

A **mixture** is a physical blend of two or more components. It can be broken down into simpler substances by physical changes.

A **homogeneous mixture** is a physical blend with uniform composition.

A **heterogeneous mixture** is a physical blend with non-uniform composition.

For example, salt water is a homogeneous mixture made of salt and water. Salt water can be heated, and the water can be removed from the mixture by evaporation. The salt remains behind. This mixture was separated by physical means.

Water is a compound made of two elements: oxygen and hydrogen. The oxygen and hydrogen cannot be separated by physical means. If water undergoes electrolysis (a chemical process), then these two elements can be separated. It takes a nuclear reaction to break an atom apart.

1. Classify each of these as a pure substance or mixture. If it is a pure substance, state whether it is an element or compound. If it is a mixture, state whether it is a homogeneous or heterogeneous mixture.

a. air \_\_\_\_\_

b. hot tea \_\_\_\_\_

c. glucose ( $C_6H_{12}O_6$ ) \_\_\_\_\_

d. granite \_\_\_\_\_

e. oxygen \_\_\_\_\_

f. chocolate chip cookies \_\_\_\_\_

g. vinegar \_\_\_\_\_

h. gold \_\_\_\_\_

i. pizza \_\_\_\_\_

## The Chemistry of Matter

### States of Matter

Another way to classify matter is by physical states of matter. Solids, liquids, and gases are the three states of matter studied in most chemistry courses.

**Solids** have a definite shape and a definite volume. Solid particles are tightly packed together and vibrate around a fixed point.

**Liquids** have an indefinite shape and a definite volume. Liquids particles are tightly packed, yet they are far enough apart to slide over one another.

**Gases** have an indefinite shape and an indefinite volume. Gas particles can be spread out as they move freely.

2. Give examples of the following substances (each example has more than one answer possible.)
- What is an example of a homogenous mixture in a gaseous state? \_\_\_\_\_
  - What is an example of a homogenous mixture in a liquid state? \_\_\_\_\_
  - What is an example of an element in a solid state? \_\_\_\_\_
  - What is an example of a compound evaporating? \_\_\_\_\_
  - What is an example of a heterogeneous mixture in a solid state? \_\_\_\_\_
  - What is an example of a compound undergoing a chemical change? \_\_\_\_\_
  - What is an example of an element in a gaseous state? \_\_\_\_\_
  - What is an example of a compound melting? \_\_\_\_\_
  - What is an example of two compounds combining to form a heterogeneous mixture? \_\_\_\_\_
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