

Matter and Energy: What is matter?

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This photo of John Muir Glacier in Alaska shows two of the three main states of matter: solid (the ice and rock) and liquid (the water). Photo from: Wikimedia Commons.

An electron, a grain of sand and an elephant all have one thing in common. All three are composed of matter. Anything that takes up space is called matter, including air, water, rocks and even people. Different types of matter can be described by their mass. The mass of an object is the amount of material that makes up the object. For example, a bowling ball has more mass than a beach ball.

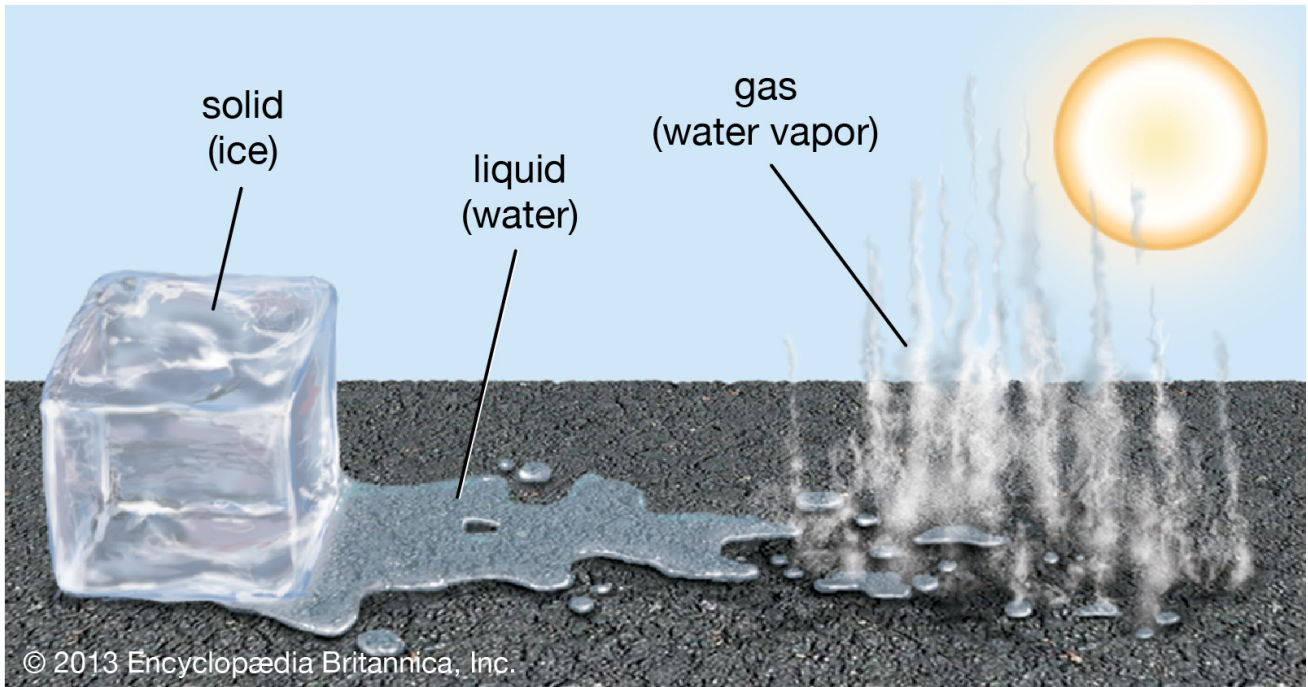
Different Boiling, Melting And Freezing Points

Matter exists in several different forms, called states. The three most familiar states are solid, liquid and gas.

Rocks, books, desks and balls are examples of solids. Matter in the solid state has a set size and shape, and the size and shape do not change easily. For example, a book looks the same even after someone moves it to a new place.

Milk, orange juice and water are examples of liquids. In the liquid state, matter has a set size, or amount. However, its shape depends on its container. For example, milk changes shape when a person pours it from a carton into a glass, but the amount of milk stays the same.

The air and the helium used to fill balloons are examples of gases. Matter in the gas state does not have a set size or shape. It can expand to fill a large container, or it can be squeezed into a smaller container.



Matter can change from one state to another. This happens when a substance is cooled or heated to a particular point. For example, heat causes liquid water to evaporate. This turns the liquid water into water vapor, a gas. The temperature at which a liquid turns into a gas is called its boiling point.

The water vapor will change back into a liquid when cooled. If it is cooled enough, water will freeze and become a solid. The temperature at which a liquid becomes a solid is called its freezing point. That same temperature can be considered the melting point if the temperature is increasing and causes a solid to become a liquid. For example, liquid water turns into solid ice when it is cooled to 32 degrees Fahrenheit. The melting point for ice is the same temperature. Different types of matter have different boiling, melting and freezing points.

Physical And Chemical Properties Of Matter

All matter has physical properties, which a person can measure without changing the matter. Color, amount and temperature are examples of physical properties.

All matter also has chemical properties. A chemical property tells how matter will change under special conditions. For example, certain metals turn to rust if they sit out in the rain. Likewise, paper and wood burn to ashes if they touch a flame. Burning and rusting are called chemical reactions. Chemical reactions change matter into new types of matter.



Quiz

- 1 Read the summary below. Choose the answer that BEST fits into the blank to complete the summary.

Matter is any material that takes up space. It can exist as a solid, liquid or gas; these are called states.

_____. It can also turn into a new type of matter by going through a chemical reaction.

- (A) Matter has physical properties, such as size, color and temperature.
 - (B) Matter in the gas state, such as air and helium, expands to fill large or small containers.
 - (C) Matter can be changed from one state to another by increasing or decreasing its temperature.
 - (D) Matter that is a solid has a set size and shape and cannot be easily changed.
- 2 According to the article, what is the relationship between ashes and rust?
- (A) Ashes are the result of a chemical reaction, while rust is the result of a change in size.
 - (B) Rust is the result of a chemical reaction, while ashes are the result of a change in size.
 - (C) Both ashes and rust are examples of materials affected by changes in temperature.
 - (D) Both ashes and rust are the result of matter being changed into a new type of matter.

- 3 Read the section “Different Boiling, Melting And Freezing Points.”

Select the paragraph that BEST explains the process of changing a liquid into a solid.

- 4 Which of the following sentences from the article gives an example of matter that has a set size but no set shape?
- (A) For example, a book looks the same even after someone moves it to a new place.
 - (B) For example, milk changes shape when a person pours it from a carton into a glass, but the amount of milk stays the same.
 - (C) The air and the helium used to fill balloons are examples of gases.
 - (D) It can expand to fill a large container, or it can be squeezed into a smaller container.