

Read About the Properties of Matter

PROPERTIES OF MATTER DEFINITION

Matter is anything that has weight and takes up space. Everything you can see and touch is made up of matter. Matter exists in three main forms: solids, liquids, and gases. It also has properties that we can describe through density, solubility, conductivity, magnetism, etc.

To better understand the properties of matter...

LET'S BREAK IT DOWN!

When scientists use the word “matter” they are talking about solids, liquids, and gases.

Matter can be found on Earth in three main forms: solids, liquids, and gases. Solids are materials that have a defined shape and volume that stays the same. Rocks are a good example of a solid – they have a rigid shape that isn't easily changed.

Liquids are a type of matter that changes shape depending on the shape of its container. For example, when you pour milk into a cup, it takes up the cup's inner shape.

Matter that spreads out to take up all the space available in the container is called a gas. Air is a gas. So is helium, which is put inside birthday party balloons.



Matter can be identified through its properties.

One clue that helps us identify matter is magnetism. *Magnetism* is the ability of a material to be attracted by a magnet. Only certain materials are attracted to magnets, like iron, nickel, and cobalt.

Another property that can help us identify matter is solubility. *Solubility* describes how well a substance can be dissolved. Some substances, like salt, are easily dissolved by water but not easily dissolved by other liquids, like acetone. Acetone is a chemical found in nail polish remover. Acetone does a great job dissolving nail polish, but it cannot dissolve salt.



Density is an important property of matter.

An object's density depends on how closely the tiny particles are packed together. Objects with a high density have particles that are more tightly packed than objects with a low density.

To better understand density you can think about the difference between a golf ball and a ping-pong ball. Even though they are about the same size, golf balls are heavier because they have a higher density.

How something floats or sinks is also related to its density. In the video, one balloon was filled with helium and the other was filled with sulfur hexafluoride. The helium balloon went up because its density is less than air. The balloon with sulfur hexafluoride sank because its density is greater than air.



Knowing the properties of matter can help you pick the right materials for the job.

If you are going on a canoe trip and want to take along some cold sodas, taking a Styrofoam cooler would be a good choice of materials. Styrofoam is not dissolved by water and is a good insulator. However, if you wanted to store some acetone for a science project, a Styrofoam container would not be a good choice. Acetone easily dissolves Styrofoam, meaning it would melt through.



If you are making a rocket engine, it might seem like a good idea to make it out of aluminum because it is a light metal, however aluminum would also melt from the rocket's heat. In this case, you might want to choose ceramic (same thing pottery is made of) because it has better properties (withstands heat).

PROPERTIES OF MATTER EXAMPLES



Sulfur hexafluoride is denser than air. When a foil boat was placed in a tank of sulfur hexafluoride, the boat floated. That's because the air in the boat is less dense than the sulfur hexafluoride gas in the fish tank.



Handles on pots do not conduct heat. Making handles out of plastic prevents the handle from becoming too hot to touch.



Sodium metal creates an exciting reaction with water. In the video we identified which metal was sodium by using a magnet. Sodium also has some interesting chemical properties – it bursts into flames when put in water!

PROPERTIES & FORMS OF MATTER VOCABULARY

Matter

Anything that has weight and takes up space.

Properties

Characteristics or attributes.

Helium

A gas that has no color or smell and is less dense than air. It is often used to make party balloons float.

Density

A property of matter that measures how close together the particles are inside a substance. This can determine things like if something will float or sink.

Sulfur Hexafluoride

A gas that is six times more dense than air. It is heavy for a gas and a balloon filled with it sinks.

Solubility

A property of matter that measures how well one thing can dissolve in another.

PROPERTIES & FORMS OF MATTER DISCUSSION QUESTIONS

Which property did Zoe use to figure out which metal was sodium and which was iron?

Zoe knew that iron is magnetic and sodium is not so she tested each with a magnet.

What property of sodium metal did you observe?

Sodium metal reacts with water causing an explosion.

Which is more dense: sulfur hexafluoride or helium? How do you know (what evidence did you see)?

Sulfur hexafluoride is more dense than air. When placed inside a balloon, the balloon falls to the ground. Helium is less dense than air. A helium-filled balloon floats in air. A boat filled with air floats on top of Sulfur hexafluoride gas.

What properties of propane make it a good choice for grilling?

Although other gases could be burned for cooking in BBQ grills, propane gas is easily compressible into tanks.

What properties make metal a bad choice of material for the handle of a pot?

Metal conducts heat, which means that it might cause your hand to be burned if used as the handle of a pot. Plastic is a better choice because it does not conduct heat as well as metal.

What properties make stainless steel a better choice for a knife and fork than Swiss cheese?

Swiss cheese is too soft to be an effective material for a knife and fork. It squishes rather than cuts. Stainless steel is hard and strong. It is even better than iron because iron rusts.
