

# Minerals

If you are reading this on a computer, you're using minerals. If you're writing notes with a pencil or a pen, you're using minerals. Even as you're learning about minerals, your body is using minerals to keep you healthy! People use minerals for many everyday purposes. But do you know what a mineral is? Continue reading to learn more about minerals and their properties.

## What is a Mineral?

Minerals are defined as solid substances that occur naturally. There are more than 4,000 different types of minerals on Earth! Every type of mineral has unique properties that make it different from other minerals.

Minerals can form in many ways. The mineral halite, which is used as table salt, forms when water evaporates in a shallow part of the ocean, leaving behind the salt it contains. Many types of minerals are made when magma cools and turns into a solid. Talc, a mineral that can be used to make baby powder, forms deep in Earth as the result of high pressure and temperature.

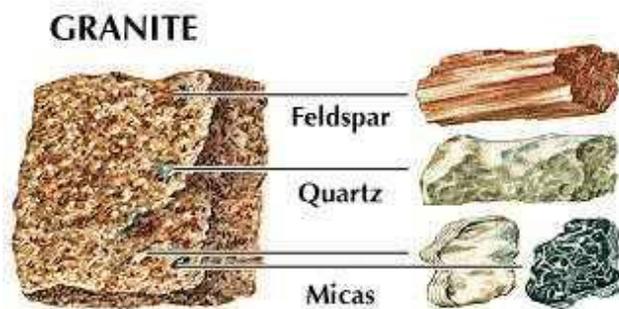


Halite forms when saltwater evaporates.

## Difference Between a Rock and a Mineral

Many people use the terms "rock" and "mineral" interchangeably...but they are not the same. Minerals have a specific chemical structure which is the same throughout the entire mineral. In other words, different samples of the same mineral will be identical.

Rocks, on the other hand, are made of two or more minerals that have been combined in some way. If you take two samples of the same type of rock, they will have some differences.



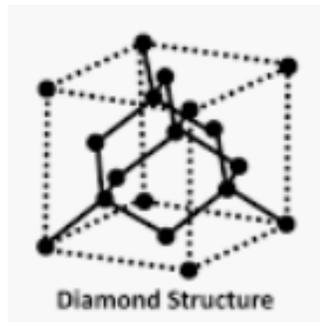
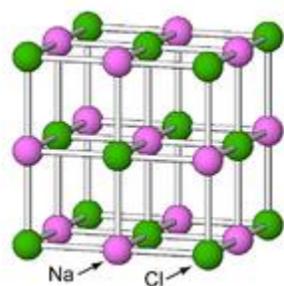
Granite is a rock made of three different minerals: feldspar, quartz, and mica.

## Characteristics of Minerals

In order to be classified as a mineral, a substance must have the following four criteria:

1. Solid – All minerals will be solids at normal temperatures on Earth. Minerals can never be liquids or gases.
2. Naturally Occurring – Minerals occur (form) in nature. Solids that are made in a laboratory don't count as minerals. Man-made objects might be made OF minerals, but they would not be considered minerals themselves.
3. Inorganic – Minerals don't come from plants, animals, or other living organisms. For example, trees are solid and occur in nature. But since trees are living things, they cannot be minerals.
4. Fixed Chemical Structure – Specific minerals will always have the same chemical formula. This means that they are made of the same exact combination of atoms and molecules. This causes them to form crystal shapes that are always the same.

For example, halite is a mineral made of a certain combination of sodium and chlorine atoms that cause the halite to form cubic (cube-shaped) crystals. Diamonds also form cubic crystals, but they are made of only carbon atoms, which makes diamond a different mineral than halite.



Halite and diamond both form in a cubic structure, but they are made of different types of atoms.

Remember - if a substance does not meet ALL four criteria, then it is not a mineral!

## Properties of Minerals

There are more than 4,000 minerals on Earth. Many minerals look similar, especially when they are embedded inside rocks. In order to identify minerals, scientists look at different properties including color, luster, density, streak, and hardness. Different types of minerals can share one or more properties, but every single type of mineral on Earth has its own unique combination of properties.

### Color –

Although color is often used to describe a mineral, it isn't the best way to tell one mineral from another. Many minerals are the same color. And some minerals can come in a wide variety of colors. So, while color is the easiest way to describe a mineral, it should never be used as the ONLY test for identifying a mineral.



### Luster –

Luster describes how well a mineral reflects light. Examples of luster include metallic, pearly, vitreous, or greasy. Metallic luster reflects light like a metal. Vitreous luster has a glassy shine. Pearly luster looks like pearls, while minerals with a greasy luster looks slippery or oily.



Metallic luster



Vitreous luster



Pearly luster

### Density –

Minerals can be measured by their density. High density materials will seem to be heavier than low density minerals. For example, talc has a density of around 2.7 g/ml, while magnetite has a density of 5.18 g/ml. A sample of talc will be much lighter than a same-sized sample of magnetite.

## Streak –

Streak is the color of the mineral in powdered form. One way to determine the streak is to rub the mineral across a rough hard surface like a tile. The color that is left behind on the tile is called the streak. The streak color is not always the same color as the mineral color, or it can even be colorless. All varieties of the same mineral – even if they are different colors – will have the same color streak.



The mineral hematite comes in different colors, but it always makes a reddish streak.

## Hardness –

A mineral's hardness describes how easily it can be scratched by another material. Scientists often use the Moh's scale to describe hardness. Using the Moh's scale, a "1" is the softest mineral. These minerals are soft enough to be scratched by your fingernail. A "10" mineral is the hardest. Diamond has a hardness of 10 because it is the hardest of all the minerals. It can only be scratched by another diamond.

Mohs Hardness Scale		
Mineral Name	Scale Number	Common Object
Diamond	10	
Corundum	9	Masonry Drill Bit (8.5)
Topaz	8	
Quartz	7	Steel Nail (6.5)
Orthoclase	6	
Apatite	5	Knife/Glass Plate (5.5)
Fluorite	4	
Calcite	3	Copper Penny (3.5)
Gypsum	2	
Talc	1	Fingernail (2.5)

# Human Consumption of Minerals

Minerals are an extremely important part of our lives. To give you an idea of how many minerals we use (and why it's so important to conserve them!), current estimates suggest that a baby born today would use in his/her lifetime:

- 800 pounds of lead
- 750 pounds of zinc
- 1,500 pounds of copper
- 3,593 pounds of aluminum
- 32,700 pounds of iron
- 26,550 pounds of clays
- 28,213 pounds of salt

### MINERALS USED IN TRANSPORT & TECHNOLOGY

1 CARS	2 ELECTRICITY	3 TYRE STOPPING	4 AEROPLANE	5 ELECTRONICS	6 COMPUTERS
<p>Many minerals are needed to make a car. Iron is used to make steel. It makes up the bulk of the car, and comes from minerals like magnetite and hematite.</p> 	<p>Coal is primarily used in the generation of electricity. Most of the electricity used in the India is produced from coal-fired facilities. Coal is also a source of raw material for making heating oil, chemicals and medicines.</p> 	<p>Most brakes can be made from asbestos minerals. But we now know that asbestos is bad for us well. Researchers are working on a replacement for asbestos in brake pads and other fixtures.</p> 	<p>Two Metals, Aluminum and Titanium, are used in jet airplanes because they are light weight and strong. Aluminum comes from a mineral called bauxite. Titanium comes from minerals called rutile and ilmenite.</p> 	<p>Mica is used in electronic insulators; ground mica in paints, as joint cement, as a dusting agent, as a drilling mud and lubricant; and in plastics, roofing, rubber and welding rods and high temperature insulators.</p> 	<p>Computers rely on the silicon chip to process information. The mineral quartz contains silicon, and is of great importance in electronics. Computer screens are made of quartz. Glass is made from quartz sand.</p> 
<p><b>HEMATITE</b></p> <p>Properties of Iron : Strong, Rigid, Hard</p> 	<p><b>COAL</b></p> <p>Properties of Clay : Easy to shape when wet. Strong and rigid when fired. Impermeable when fired. A thermal insulator</p> 	<p><b>ASBESTOS</b></p> <p>Properties of Asbestos : Flexible, Durable, Non Flammable</p> 	<p><b>BAUXITE</b></p> <p>Properties of Aluminium : Strong, Light Weight, Rigid</p> 	<p><b>MICA</b></p> <p>Properties of Mica : Does not conduct electricity. Has a high melting point</p> 	<p><b>QUARTZ</b></p> <p>Properties of Quartz : Hard, Rigid, Impermeable, Transparent (see-through)</p> 

### MINERALS USED IN HEALTH & MEDICINES

HEALTH		MEDICINES			
1 PLASTER	2 THERMOMETER	3 KAOLINE	4 SELENITE	5 MICA	6 BISMUTH
<p>Casts are made from bandages soaked in wet plaster. When they are wrapped around your arm or leg they set in a solid mass after a couple of hours. Plaster is made from a mineral called Plaster Clay.</p> 	<p>When you are ill you may have your temperature taken using a thermometer. Many thermometers contain mercury that comes from an ore called cinnabar.</p> 	<p>Kaolin is an Adsorbent Medicine used to Treat Diarrhoea.</p> 	<p>Selenite has an irritant action on the mucous membranes of the respiratory tract and the conjunctiva.</p> 	<p>Albrak Bismuta is a frequently used ayurvedic medicine for curing many diseases like hepatitis, tuberculosis, asthma, plague, etc.</p> 	<p>Bismuth is an organic bismuth-containing compound used to treat eye infections.</p> 
<p><b>GYPSUM</b></p> <p>Properties of Gypsum : Easy to shape when wet. Strong and rigid when set. Quick to set (hardens)</p> 	<p><b>CINNABAR</b></p> <p>Properties of Mercury : Is a liquid at room temperature. Expands with increasing</p> 	<p><b>CALCITE</b></p> <p>Calcium Finds in Calcite which is used in Building Bones &amp; Teeth.</p> 	<p><b>FULLER'S EARTH</b></p> <p>It is good for drawing excess oils from the skin and stimulates circulation to the skin.</p> 	<p><b>SULPHUR</b></p> <p>Gandhak (Sulphur) is used in Cure for Skin Diseases.</p> 	<p><b>MAGNETITE</b></p> <p>Magnetite is a Ore of Iron which forms the main part of haematite</p> 

### MINERALS USED IN KITCHEN

All Plates, glasses, and mugs; knives, forks and spoons. They are all made from minerals.

1 CUTLERY	2 CROCKERY	3 DRINKING GLASS	4 POTS & PANS	5 CANS & TINS	6 SALT
<p>Knives, forks and spoons are usually made from stainless steel. Stainless steel is made by mixing iron with another metal called Chromium which stops the steel from rusting. Iron and chromium both come from minerals.</p> 	<p>Plates, bowls, cups, saucers and mugs are made from clay minerals. You may have used clay at school to make a pot or bowl. Once it has been fired clay is fairly hardwearing. It is also a good thermal insulator.</p> 	<p>Most people have seen a quartz crystal. But did you know that quartz is the major ingredient in glass? Pure quartz sand is melted down, and mixed with other ingredients to make glasses of different sizes, shapes and colours.</p> 	<p>Pots and pans are made from metal - Copper or Aluminium. All of these come from minerals. Fluorine is used to make non-stick Teflon and comes from the mineral fluorite.</p> 	<p>Cans for fizzy drinks are made of aluminium, which comes from a mineral called bauxite. It is light, easily shaped, and does not rust. Tin cans - the cans you get your baked beans in - are actually made of steel.</p> 	<p>Do you know which mineral you eat every day? Halite is the mineral name for common salt - the kind you would put on your Vegetables. Salted chips. It is an essential part of our diet.</p> 
<p><b>MAGNETITE</b></p> <p>Properties of stainless steel: Strong, Rigid, Hard, Does not rust</p> 	<p><b>CLAY</b></p> <p>Properties of Clay : Easy to shape when wet. Strong and rigid when fired. Impermeable when fired. A thermal insulator</p> 	<p><b>QUARTZ CRYSTAL</b></p> <p>Properties of stainless steel: Hard, Rigid, Impermeable Transparent (see-through)</p> 	<p><b>CHALCOPHYRITE</b></p> <p>Properties of Pots Material: Strong, Impermeable, Do not rust, Conduct heat</p> 	<p><b>BAUXITE</b></p> <p>Properties of Aluminium: Impermeable. Do not rust, Compressible (you can squash them)</p> 	<p><b>HALITE</b></p> <p>Properties of Natural Salt: Soft. Breaks up easily. Dissolves in water (see salty!)</p> 

### MINERALS USED FOR NEAT & TIDY

1 EMERY BOARD	2 WASHING CLOTHS	3 TOOTH PASTE	4 TALCUM POWDER	5 WATCHES	6 SCRUBBING
<p>Many people use emery boards to keep their nails neat and tidy. Emery is a fine-grained natural mixture of the minerals corundum and magnetite.</p> 	<p>The mineral halite (table salt) is used to make the soda crystals that we use to remove stubborn greasy stains.</p> 	<p>The fluoride in toothpaste is a chemical made from the mineral fluorite. It is thought that fluoride reduces tooth decay, so if you clean your teeth every day.</p> 	<p>To keep fresh and smelling sweet many people dust themselves with talcum powder. As you can guess, talcum powder is made by grinding the mineral talc into a fine powder.</p> 	<p>The strap and casing of some watches are made of metal, and small quartz crystals help to regulate their timing.</p> 	<p>Many people use Pumice to keep their feet neat and tidy. Pumice is a fine-grained natural clay.</p> 
<p><b>CORUNDUM</b></p> <p>Properties of Corundum : Hard, Abrasive</p> 	<p><b>HALITE</b></p> <p>Properties of Halite : Dissolve in Water, Breaks up Easily</p> 	<p><b>FLUORITE</b></p> <p>Properties of Fluorite : Breaks up Easily, Soft</p> 	<p><b>TALC</b></p> <p>Properties of Talc : Breaks up Easily, Soft</p> 	<p><b>QUARTZ</b></p> <p>Properties of Quartz : Hard, Rigid, Impermeable, Transparent (see-through)</p> 	<p><b>PUMICE</b></p> <p>Properties of Pumice : Soft, Very Light which can swim in Water.</p> 