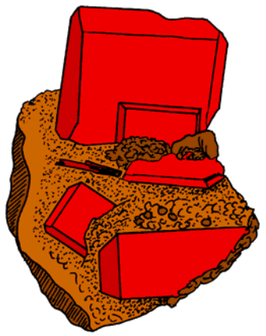


Wulfenite

Meaning/Origin of the Name: Named in honor of Franz Xavier Wulfen, an Austrian mineralogist who first described this mineral in 1785.

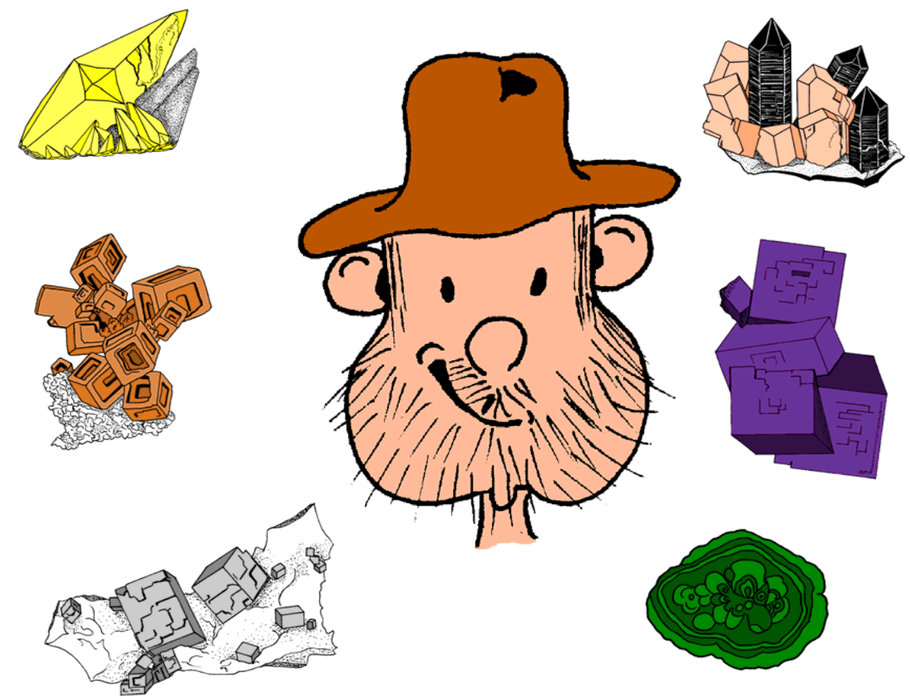
Physical Properties:
Hardness: 2 ¾ to 3 **Cleavage:** One good cleavage plane
Crystal System: Tetragonal **Color:** Orange, yellow, red, brown
Streak: White **Luster:** Resinous to adamantine

Uses: A minor ore of the element molybdenum. It is an extremely popular mineral with collectors.

Interesting Facts: Wulfenite frequently forms blocky crystals (mineralogists describe this habit as *prismatic*). However, wulfenite crystals can be so thin that you can actually see right through them.

Mineral Bingo

A fun & exciting way to learn about minerals, their properties and uses.



Mineral bingo

Everybody loves BINGO! It's easy. It's fun. And it's a great way to learn. This "Mineral Bingo" game is designed to introduce all ages to the wonderful, colorful and interesting world of minerals and crystals.

The following pages have a number of suggestions on how to play, from simple matching the pictures to memorization of mineral facts. Choose the option that is best for your goals and setting.

Mineral bingo is the latest of many popular products for kids and families about minerals and crystals including mineral activity books, patch programs for clubs, cut-and-fold crystal models and more. Visit our website, email, write or call for more information about Diamond Dan Publications' products.

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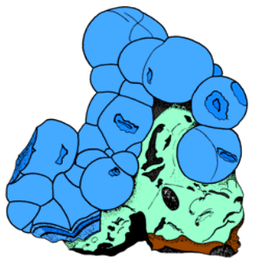
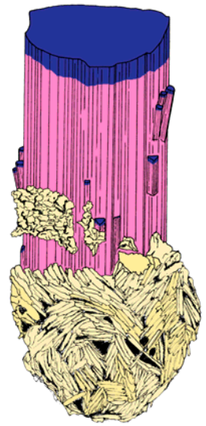




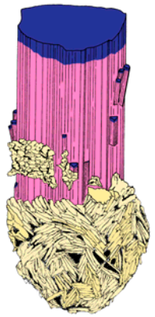
Silver

Meaning/Origin of the Name: From the Old English word *seolfer*. This name is related to the German word *silber* and the Dutch word *zilfer*. (See how they look and sound very similar?!)

Physical Properties:
Hardness: Soft, 2 ½ to 3 **Cleavage:** None
Crystal System: Isometric (cubic) **Color:** Bright silver
Streak: Silver **Luster:** Bright metallic

Uses: In the manufacture of film. It is used in chemistry. Because it conducts electricity so well (even better than copper) it is used in some specialized electrical applications. Frequently used in jewelry. Decorative and table-setting items (like sugar bowls, forks, knives and spoons) are commonly made of an inexpensive metal and coated with a layer of silver (called "silver plate").

Interesting Facts: An early Latin name for silver was *Luna* which means *moon*, because polished silver is very bright and looks almost white. Silver tarnishes very easily and very quickly from sulfur that is in the air.

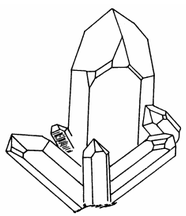


Tourmaline

Meaning/Origin of the Name: From the Sinhalese word *toramallie*. Originally this word referred to all gems found in the country of Sri Lanka.

Physical Properties:
Hardness: 7 **Cleavage:** None
Crystal System: Hexagonal **Color:** Black (schorl), brown (dravite), green, yellow and red (elbaite). Also pink, blue.
Streak: None **Luster:** Vitreous (glassy)
Uses: Clear and well-colored tourmalines are cut and polished to make gems for jewelry. Some tourmaline crystals are used in high-pressure gauges.

Interesting Facts: Tourmaline has a special property called *piezoelectricity*. When pressure is applied to the crystal, an electric charge is created in the crystal. Pink tourmaline is the birthstone for the month of October.



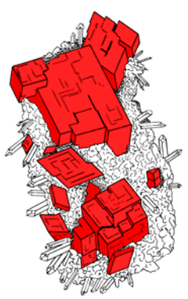
Quartz

Meaning/Origin of the Name: Probably from the German word *quarz*. No one really knows the origins of this German word.

Physical Properties:
Hardness: 7 **Cleavage:** Rhombohedral
Crystal System: Hexagonal **Color:** Colorless (rock crystal), yellow (citrine), black or dark brown (smoky), purple (amethyst), green (aventurine).
Streak: None (too hard) **Luster:** Vitreous (glassy)

Uses: Quartz sand is used to make glass. Quartz is used to control electrical pulses in watches and all sorts of electronic equipment. It is often cut into gemstones.

Interesting Facts: In ancient Rome, people found quartz crystals high in the mountains where it would be extremely cold, especially in the winter. It was believed back then that quartz was water that had frozen so hard and so cold that it had become "petrified ice," that is, ice that had frozen so hard that it would never thaw out. If you touch a quartz crystal, you will feel how cool it is. This is because the quartz moves heat away from your hand very easily and quickly.



Rhodochrosite

Meaning/Origin of the Name: From the Greek phrase *rhodochros* meaning *rose-colored*. This is a reference to rhodochrosite's beautiful pink and red colors.

Physical Properties:
Hardness: 3 ½ to 4 ½ **Cleavage:** Perfect rhombohedral
Crystal System: Hexagonal **Color:** Light pink to deep red
Streak: White **Luster:** Dull to vitreous (glassy)

Uses: Banded rhodochrosite is often cut and polished to create decorative works of art and jewelry. It is an extremely popular mineral with mineral collectors.

Interesting Facts: The spectacular rhodochrosite crystals from Colorado were discovered in a silver mine. Rhodochrosite contains the element manganese.

Different Ways to Play
Mineral bingo

Mineral Bingo is fun for children and adults of all ages. Below are some suggestions you may find helpful for your situation.

Keep it Simple

If you have small children, you may want to keep it simple. Cut up the cards, throw them in a bowl or hat, and pick out one at a time. Help the younger children match the pictures. Say the mineral names. They will eventually remember the names and the correct pictures of each mineral. When any player has five in a row, yell BINGO! Help the younger children notice when they have won. Everyone can help them yell BINGO! Make it extra fun by offering simple prizes for the winner of each round. Many families like to pick a different BINGO card for each round.

Teach Mineral Facts

The following pages of this booklet list all the minerals found in Mineral Bingo (in alphabetical order). Each mineral entry is followed by a number of facts about the mineral including physical properties, the origins of the mineral's name, special properties and the mineral's uses. When you pick a card out of the hat, read a fact or two about that mineral. The players will learn about the minerals a little at a time. When a player has BINGO! ask the player to read back the five minerals in their bingo row. Offer small prizes, minerals if possible, for winning the round.

Make it Harder!

Play the game just like directed in the "Teach Mineral Facts" section above. When a player has BINGO! ask the player to read back the five minerals in their bingo row. To get credit for the five spaces, however, the winner has to give one or two facts for each mineral in the row of five (you decide how many facts they need to give). For instance, have the person with BINGO! give a use for each of the minerals. Or have the winner give one physical characteristic of each. Mix it up: ask for a different fact for each round. For example, Round 1 can be "mineral uses" and Round 2 can be "Color" and Round 3 can be "Metallic or Non-Metallic" and so on. Offer small prizes, minerals if possible, for winning the round. If one of the winner's spaces is the FREE space, expect them to give a fact about a mineral that you choose.

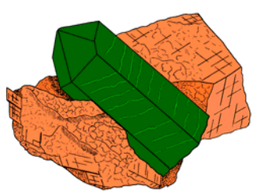
Make It Even Harder

For a group of more advanced mineral enthusiasts, give a fact about the mineral chosen from the hat *without giving the mineral name.* Challenge the players to identify the mineral based on the fact given. If one of the winner's spaces is the FREE space, expect them to give a fact about a mineral that you choose.

Let the Young Players Lead the Game

Whenever possible have your Jr. Leaders lead the rounds. They will gain leadership skills and they will gain knowledge about minerals as they read the facts to the players over and over again.

Mineral Information



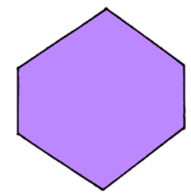
Apatite

Meaning/Origin of the Name: From the Greek word *apatan* which means *to deceive*, because the mineral apatite sometimes looks like other minerals such as aquamarine, amethyst and tourmaline.

Physical Properties:
Hardness: 5 **Cleavage:** Poor
Crystal System: Hexagonal **Color:** Green, Blue, Purple
Streak: Always White **Luster:** Glassy (vitreous)

Uses: Apatite is used in making fertilizers. It is also used in the chemical industry for the element phosphorus found in apatite.

Interesting Facts: It is too soft to be worn as a gem, but perfectly clear crystals have been cut into gemstones. The chemical composition of your bones and teeth are the same as apatite.



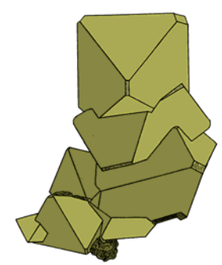
Mica

Meaning/Origin of the Name: Probably from the Latin word *micare*, which means *to shine* because mica looks shiny (glassy) in the sunlight.

Physical Properties:
Hardness: 2 to 2 ½ **Cleavage:** Perfect basal (micas break into extremely thin sheets)
Crystal System: Monoclinic
Color: Brown, yellow, silvery-yellow, black, purple.
Streak: White **Luster:** Vitreous (glassy)

Uses: Micas are used as an insulator in electrical components. Lepidolite mica is an important source of the element lithium. It is crushed into very small, fine flakes and used as a lubricant. Fake "snow" is made from crushed mica.

Interesting Facts: The term "mica" refers to a number of similar minerals including muscovite, biotite, phlogopite and lepidolite. Many years ago, before glass was affordable and commonly used, sheets of mica were used as windows in coal and wood stoves. Lepidolite is a purple variety of mica (the color variety pictured in this game).



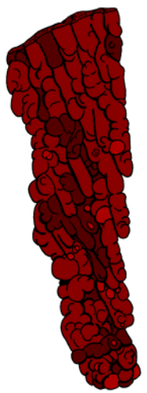
Pyrite

Meaning/Origin of the Name: From the Greek word *pyr* that means fire, because it sparks when it is truck with steel.

Physical Properties:
Hardness: 6 to 6 ½ **Cleavage:** Poor
Crystal System: Isometric (cubic)
Color: Bright brass yellow; sometimes tarnished green
Streak: Always grayish-green **Luster:** Bright metallic

Uses: Sometimes used as an iron ore. A source of sulfur. Sulfur is used for making chemicals for industrial uses (like sulfuric acid).

Interesting Facts: Pyrite is also called "Fool's Gold" because so many inexperienced and uneducated gold prospectors thought they discovered gold when they only found pyrite (they were "fooled"). Pyrite often has important amounts of gold trapped in its crystals, making some pyrite deposits a true gold ore.



Hematite

Meaning/Origin of the Name: From the Greek word *haimatites*, which means *bloodstone* because hematite always has a blood-red streak.

Physical Properties:
Hardness: 5 ½ to 6 ½ **Cleavage:** None
Crystal System: Hexagonal **Color:** Deep blood-red, black and silver
Streak: Always deep blood red **Luster:** Dull, earthy, or metallic

Uses: Hematite is the most important ore of iron.

Interesting Facts: In the Alps (mountains in Europe) groups of hematite crystals grew together into the shape of flowers. Collectors call them "hematite roses" and they are very popular (and now, very rare) collectors' specimens. If you find one, you can be sure it will be extremely expensive.

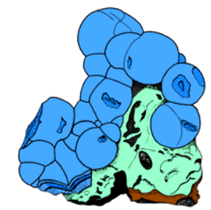
Malachite

Meaning/Origin of the Name: From the Greek word *moloche* meaning *mallow*. "Mallow" is a plant, so the name is a reference to the fact that malachite is always some shade of green.

Physical Properties:
Hardness: 3 ½ to 4 **Cleavage:** One good cleavage plane
Crystal System: Monoclinic **Color:** Light and dark green
Streak: Light and dark green **Luster:** Silky in masses. Vitreous (glassy) in crystals.

Uses: Massive malachite is often cut and polished to make jewelry and other decorative items (bowls, statues, boxes, vases, etc.). It is sometimes used as a copper ore.

Interesting Facts: Huge blocks of malachite have been mined in Russia and Africa. Malachite forms near the surface and so is easily mined as a copper ore.



Azurite

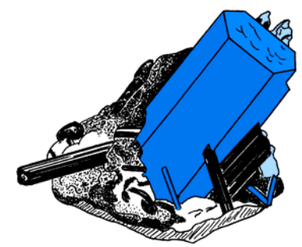
Meaning/Origin of the Name: After the *azure* (blue) color of this beautiful mineral.

Physical Properties:
Hardness: 3 ½ to 4 Cleavage: Fairly good cleavage.
Crystal System: Monoclinic Color: Deep blue (almost black) to light blue
Streak: Blue Luster: Glassy (vitreous)

Uses: Sometimes used to in ornaments and decorations in buildings and jewelry. Mostly of great interest and value to mineral collectors.

Interesting Facts: Azurite and malachite are very similar minerals. They both contain copper. Over time, azurite turns into malachite. Many years ago, painters used azurite to make blue paint. Today their blue paint has turned to green!

Beryl

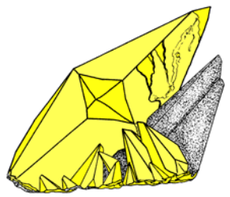


Meaning/Origin of the Name: It was named from the Greek word *beryllos*, which is believed to refer to a town in Southern India called "Belur." Belur was near important gem deposits.

Physical Properties:
Hardness: 7 ½ to 8 **Cleavage:** Basal (imperfect)
Crystal System: Hexagonal **Color:** Colorless (achroite), blue (aquamarine), pink (morganite), red, yellow (heliodor), green (emerald)
Streak: None (too hard) **Luster:** Glassy (vitreous)

Uses: Source of the element beryllium. Beryllium is mixed with other metals like aluminum to make very strong, lightweight metals for aircraft and spacecraft.

Interesting Facts: Clear beryl is cut into gemstones. Some varieties, like emerald, can be more valuable than diamonds. Fake or synthetic beryls are commonly made in laboratories and sold in jewelry stores.



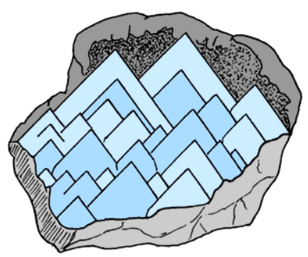
Calcite

Meaning/Origin of the Name: From the Latin word *calx* which means *burnt lime*.

Physical Properties:
Hardness: 3 **Cleavage:** Perfect Rhombohedral
Crystal System: Hexagonal **Color:** Colorless (Iceland Spar), yellow, tan, green, blue, black, brown, golden brown, white, red.
Streak: White **Luster:** Glassy (Vitreous)

Uses: In building including making cement and sometimes as an ornamental stone. In the manufacture of fertilizers. In the chemical industry to make other important chemicals and gases. It is sometimes crushed into a powder and added to paint and rubber.

Interesting Facts: Calcite is often fluorescent. When ultraviolet light shines on many calcite specimens, they glow fluorescent colors. The calcite from Ogdensburg, New Jersey glows bright orange-red.



Celestite

Meaning/Origin of the Name: From the Latin word *coelestis* meaning *heaven* or *sky*, a reference to the sky-blue color of some fine celestite crystals.

Physical Properties:
Hardness: 3 to 3 ½ **Cleavage:** Perfect in one direction
Crystal System: Orthorhombic **Color:** Colorless, pale blue, pale yellow and milky white.
Streak: White **Luster:** Glassy (vitreous) and sometimes pearly.

Uses: The most important ore of the element strontium. Strontium is used to make the red color in fireworks. It is also used in the rubber making process, in paints, batteries and some special types of glass.

Interesting Facts: Light blue celestite is eagerly sought by collectors and museums. It is believed that the blue color comes from very small amounts of gold trapped in the celestite crystals.

Gold

Meaning/Origin of the Name: No one is sure of the origins of the name *gold*.

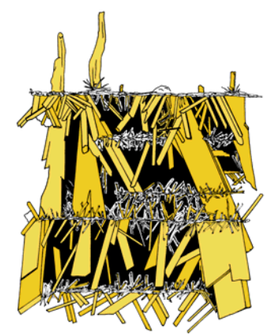
Physical Properties:
Hardness: 2 ½ to 3 **Cleavage:** None
Crystal System: Isometric (cubic) **Color:** Bright golden-yellow
Streak: Golden-yellow **Luster:** Bright metallic

Uses: For electrical connections in computer circuit boards and specialized electrical applications. In medicine such as some chemotherapy medicines. Most common and well-known use is in jewelry.

Interesting Facts: One ounce of gold can be hammered into a sheet of gold that is 10 feet long by 10 feet wide. One ounce of gold can be pulled into a single wire 5 miles long!

Pure gold is too soft to be used in jewelry. So, it is mixed with other metals to make it harder.

The California Gold Rush produced 125 million ounces of gold. That gold would be worth well over $50 billion dollars in today's money!



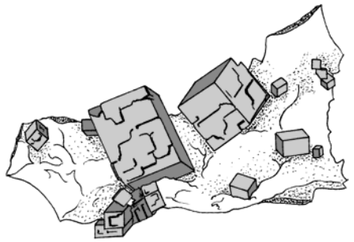
Gypsum

Meaning/Origin of the Name: From the Greek word *gypsos*, which means *plaster*. When gypsum is heated and crushed into a powder, it becomes *Plaster of Paris*. When water is added to Plaster of Paris, it becomes plaster, which can be used to make walls and plaster castings.

Physical Properties:
Hardness: 2 **Cleavage:** Perfect into thin flakes
Crystal System: Monoclinic **Color:** Colorless, golden brown, yellow, green, brown.
Streak: White **Luster:** Glassy (vitreous); sometimes silky.

Uses: For *Plaster of Paris* which is used in construction and art. It is also used in some fertilizers. Plaster from gypsum is used to make "wall board" which is the product used to make the walls in your home and school.

Interesting Facts: A harder form of gypsum is called *alabaster*. Alabaster is carved into decorative pieces and sculptures.



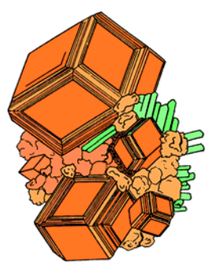
Galena

Meaning/Origin of the Name: An ancient Latin word for *lead ore*.

Physical Properties:
Hardness: 2 ½ **Cleavage:** Perfect cubic
Crystal System: Isometric (cubic) **Color:** Steel gray
Streak: Gray **Luster:** Metallic

Uses: The primary ore of lead. Lead is used mostly in batteries.

Interesting Facts: There is often enough silver trapped in galena to make galena a source of silver as well as lead.



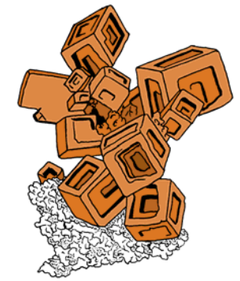
Garnet

Meaning/Origin of the Name: From the Latin word *granatum* which means *a pomegranate* because small, red garnets were thought to look like pomegranate seeds. This name has been used for this mineral group for many hundreds of years.

Physical Properties:
Hardness: 6 to 7 ½ **Cleavage:** None
Crystal System: Isometric (cubic) **Color:** Red (almandine), orange (hessonite), green (uvarovite), purple (pyrope), brown (spessartine), pale tints of pink and green (grossular).
Streak: None (too hard) **Luster:** Vitreous (glassy)

Uses: Some varieties are crushed and used to make sandpaper. Clear, deeply colored specimens are cut as gemstones.

Interesting Facts: Garnet is the birthstone for the month of January.



Copper

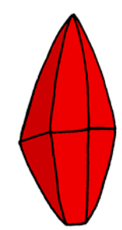
Meaning/Origin of the Name: From the Greek word *kyprios*, that is, the Island of Cyprus, where copper was once found.

Physical Properties:
Hardness: Soft, 2 ½ to 3 **Cleavage:** None
Crystal System: Isometric (cubic) **Color:** Copper-red. Often turning green, as the copper becomes malachite.
Streak: Copper-red **Luster:** Metallic

Uses: Electrical wire. Copper pipes. Mixed with other metals to make brass and bronze (a mixture of metals is called an *alloy*).

Interesting Facts: Copper is ductile which means it can be stretched into very thin wires. It is also malleable which means it can be hammered into very thin sheets. Natural copper (called *native copper*) is rare. It is found in great masses, though, around Lake Superior in Northern Michigan on the Keweenaw Peninsula. Masses of copper weighing more than 8,000 pounds have been discovered there. The finest copper crystals are from this region, too.

Copper conducts heat and electricity very well.



Corundum

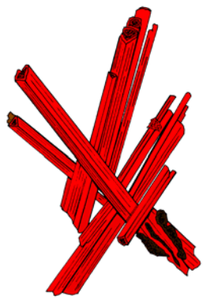
Meaning/Origin of the Name: This name probably came from an old Indian name for this mineral, *Kauruntaka*. ("Indian" here means the country of India, not Native Americans.)

Physical Properties:
Hardness: 9 **Cleavage:** None
Crystal System: Hexagonal **Color:** Dark red to brown; red (ruby); colorless to yellow to blue (sapphire).
Streak: None **Luster**: Dull. Gem varieties (ruby and sapphire) are glassy (vitreous).

Uses: Massive corundum (called *emery*) and unattractive corundum crystals are ground up and used to make sandpaper, sanding belts and other abrasives.

Interesting Facts: Corundum was one of the first gem materials to be made in the laboratory. Today, a large amount of synthetic "ruby" and "sapphire" is cut and sold as gems for jewelry.

Corundum is number 9 on the Mohs' Hardness Scale. Ruby is the birthstone for the month of July. Sapphire is the birthstone for September.



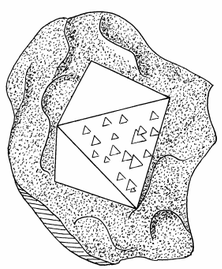
Crocoite

Meaning/Origin of the Name: From the Greek word *krokos* which means *saffron*. "Saffron" is the bright orange-red portion of the crocus flower, which is used as a seasoning.

Physical Properties:
Hardness: Soft, 2 ½ to 3 **Cleavage:** Poor cleavage
Crystal System: Monoclinic **Color:** Bright orange-red
Streak: Orange-yellow **Luster:** Adamantine (bright, diamond-like) with a greasy look.

Uses: Crocoite is not commonly used for any purpose. It is extremely popular with mineral collectors and museums. Fine crystals and crystal groups can be very expensive.

Interesting Facts: The first pure samples of the element chromium came from crocoite specimens.



Diamond

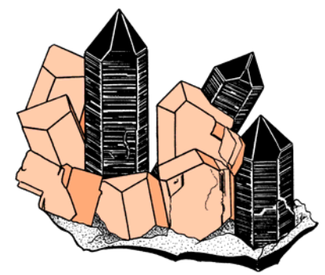
Meaning/Origin of the Name: Diamond is the hardest substance on earth. You could say it is indestructible. Its name is from a Greek word, *adamas*, which means *invincible*.

Physical Properties:
Hardness: 10 **Cleavage:** Perfect octahedral (8-sided)
Crystal System: Isometric (cubic) **Color:** Colorless, gray, black, white, rarely blue, red, yellow.
Streak: None (too hard) **Luster:** Adamantine

Uses: Non-gem diamond is used to make cutting wheels and drills. Gem grade diamond is used in jewelry.

Interesting Facts: Diamond is made of carbon and is the hardest substance on earth. Graphite is also made of carbon and is one of the softest minerals on earth! Diamonds form deep in the earth, most probably in the earth's mantle, under conditions of extreme heat and pressure. Synthetic diamonds have been made in the laboratory, but they are usually extremely small since it is so difficult to recreate the heat and pressure needed to form a diamond.

Diamond is the birthstone for the month of April.



Feldspar

Meaning/Origin of the Name: The original, and longer, name for this group of minerals was *fieldspar*, because some early specimens were found in fields. "Spar" refers to any non-metallic mineral that breaks (cleaves) on flat surfaces and has a glassy (also called *vitreous*) luster.

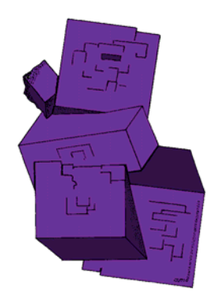
Physical Properties:
Hardness: 6 **Cleavage:** 2 good cleavage planes at 90 degrees to each other
Crystal System: Monoclinic & Triclinic (see *Interesting Facts)*
Color: Green, white, flesh-pink, yellow, brown
Streak: White **Luster:** Glassy (vitreous)

Uses: Orthoclase is used to make porcelain and glass and is used in detergents. Microcline is polished as an ornamental stone.

Interesting Facts: "Feldspar" refers to a group of minerals. The monoclinic feldspar is orthoclase; the triclinic feldspars are microcline (green variety is called amazonite), and a series of feldspars called the Plagioclase Series.

Feldspars are the most abundant minerals in the earth's continental crust.

Feldspars usually contain small amounts of radioactive elements in their crystals. When these radioactive elements decay, they release radiation. This radiation turns clear quartz into black, smoky quartz. This is why it is common to find feldspar crystals with smoky quartz crystals.



Fluorite

Meaning/Origin of the Name: From the Latin word *fluere* which means *to flow* because it melts easily.

Physical Properties:
Hardness: 4 **Cleavage:** Perfect Octahedral (8-sided, diamond-shaped)
Crystal System: Isometric (cubic) **Color:** Colorless, yellow, pink, green, blue, purple, red, brown.
Streak: White **Luster:** Vitreous (glassy)

Uses: Fluorite is mixed with iron ore as a *flux*. A "flux" is a material that lowers the melting temperature of a metal. In industry, fluorite is the source of the element *fluorine*, which is used to make hydrofluoric acid and other important chemicals.

Interesting Facts: Fluorine is combined with other elements to make *fluoride*, which is added to toothpaste to make teeth stronger.