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BUBBLE & FIZZ

WEEK 10: CRYSTALS

EVER WONDER . . . HOW A GEODE IS FORMED?

What we learned this week:

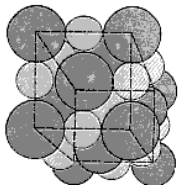
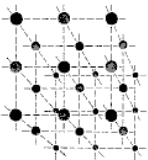
- ◆ A crystal is a solid that has an ordered molecular structure; the atoms are arranged into repeating patterns.
- ◆ Geodes are hollow rocks that have crystals lining the inside.
- ◆ Quartz, snowflakes, diamonds, and salt are all crystals.

Today's Experiments

1. Observe different crystal types.
2. Make crystal structures.
3. Grow Epsom salt crystals.
4. Break open a geode.

Did you know?

- ◆ A crystal is a solid that has an ordered molecular structure. (Other solids have a random molecular structure.) Snowflakes, diamonds and salt are all examples of crystals. For example, if you look at salt through a magnifying glass, you will see that the grains are all the same shape (though they may be different sizes), with straight edges and flat surfaces. Some mineral crystals, like salt, are created when the mineral separates out of a solution ("precipitates") and collects into crystal forms. This is how we made our Epsom salt gardens.

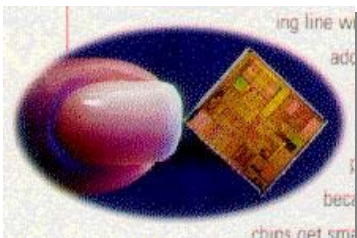


- ◆ Crystals form when a melted mass of matter starts to cool. As it cools, the atoms arrange themselves into a repeating pattern. There are seven types of crystal structures: cubic (silver, gold, diamond, salt), tetragonal (silicon), hexagonal (ice, snowflake, quartz), orthorhombic (topaz, Epsom salt), rhombohedral (calcite), monoclinic (gypsum), and triclinic (turquoise).
- ◆ Some words geologists use to describe crystals include face (the crystal's flat side), vertex (the corner or point), and edge (the border between two vertices).

- ◆ Crystals are used in many products, including jewelry, electronics, solar cells and optics. For example, a microprocessor, the tiny, enormously powerful high-speed electronic brain that contains the basic logic, storage and arithmetic functions of a computer, is typically etched on a single "microchip" made from slices of silicon crystals. The image at left is a microchip. Silicon is used because it makes an excellent "semiconductor" – a material that both conducts electricity and insulates against it. The first chips invented were used in Air Force computers and the Minuteman missile in 1962. Later, they were used to make the first electronic



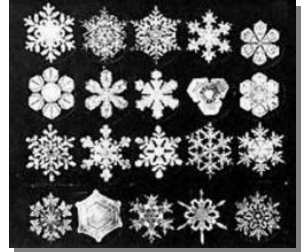
portable calculators. Now, almost all modern electrical products use microchips – everything from computers to space ships to hearing aids. This invention has literally changed the world!



- ◆ Geodes are hollow rocks that have crystals lining the inside. They can be less than an inch wide or several feet across! Geodes begin as holes in the ground – formed by bubbles in volcanic rock, air pockets left by dissolving fossils, or sometimes even holes made by a

burrowing animal. Over a long period of time, the outer part of the cavity hardens into rock while the inside collects water rich in minerals. Over time, mineral crystals grow and a geode is created.

- ◆ The most common crystal found in geodes is quartz, but amethyst, calcite and other crystals may also be inside. Every geode is unique; the only way to find out what is inside is to break it open! Most geodes are found in deserts, volcanic ash beds, and regions containing a great deal of limestone, such as in the American mid-west.
- ◆ Ice crystals grow directly from condensing water vapor in the air, usually around a nucleus of dust or some other foreign material. Snow flakes are a complex arrangement of loosely connected ice crystals. There are two main types of ice crystals: basic plate-like forms with a six-fold symmetry and basic column-like forms, such as needles or hollow columns. The type of crystal that forms depends mainly on the temperature and supersaturation level in the cloud where the formation takes place.



Amazing Scientist



Masahiro Irie, Ph.D. Dr. Irie is a chemist who studies the molecular structure of crystals. He is a professor at Kyushu University in Japan and has invented a new type of crystal. This new crystal can bend and change its shape in response to ultraviolet light. Dr. Irie believes that these bendable crystals will be useful “mini machines.” They can potentially act as switches and levers in medical devices or even mini-tweezers to move cells!

Curiosity @ Home

Make eggshell geodes. Materials: 1 c. Epsom salts (usually in the bath section; we get ours at Shopper’s Food Warehouse), ½ c. very hot water (close to boiling), 2 clean eggshell halves held upright in egg carton or similar, food coloring. Procedure: Add the Epsom salts to the hot water ¼ c. at a time and stir. Keep adding salts until they stop dissolving (the point at which your solution becomes “supersaturated”). Put two drops of food coloring in the bottom of each eggshell, then fill each to within ¼ inch of the top with the salt water solution. Place in a sunny, warm spot and watch your crystal “geodes” grow over the next several days!

Word Search

Find the following words from class today

(look up, down, backwards, forwards & diagonally):

- Crystal
- Geode
- Quartz
- Vertex
- Snowflake

A	S	B	F	A	A	B	M	K	S	E	R	U	P	T	Y	X	C
C	U	O	O	G	Z	T	R	A	U	Q	T	T	A	E	P	R	H
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