Grade 7 Science

Week of November 30– December 4

Crystals

Examples of Crystal Structures

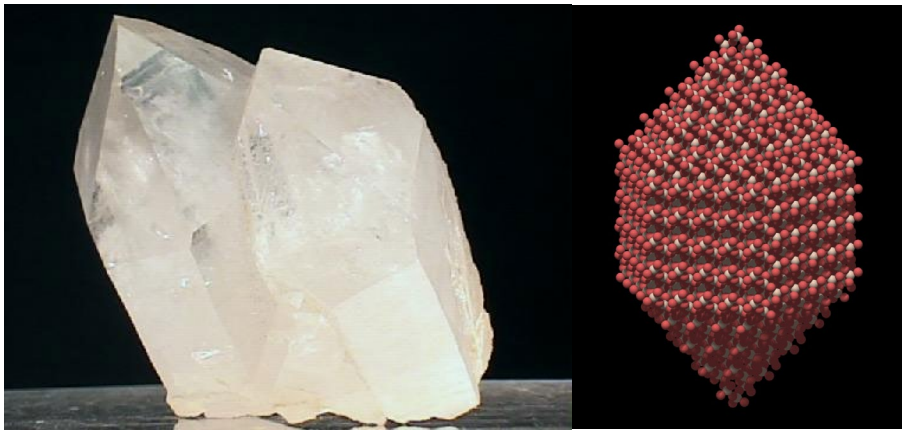
Crystals or crystalline solids are materials that are constructed from atoms with a repeating arrangement that is the same throughout the entire crystal structure.

Each type of crystal has its own specific types of atoms or elements and its own specific repeating arrangement so there are many different types of crystals.

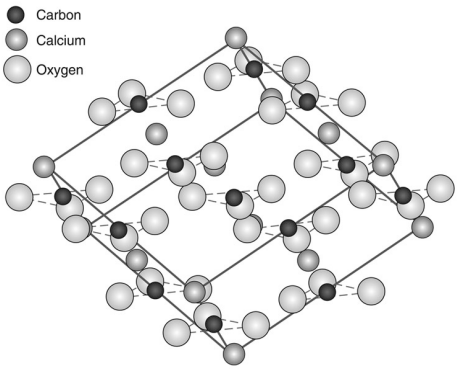
Crystals can have many different shapes and as they form they keep the same structure. Crystals can be shaped like cubes, prisms, double pyramids, or shapes that lack this symmetry. Crystals can have sides or faces that vary in number such as 6, 8 or 10.

Feldspar is the most common mineral crystal in the Earth's crust.

Quartz is the second most common and the crystal is a continuous arrangement (lattice) of silicon and oxygen.



Calcite forms stalagmites and stalagtites in caves. See crystal lattice below.



Crystals are found in living things. Calcite is a part of the shells of marine organisms such as plankton. Argonite is found in mollusk shells and coral skeletons.

Kidney stones may form in one of every 20 humans. Calcium oxalate crystals form when there is not enough water in the urine to keep the calcium and oxalate ions dissolved. In some people these crystals will clump together forming kidney stones as big as a golf ball. Ouch!

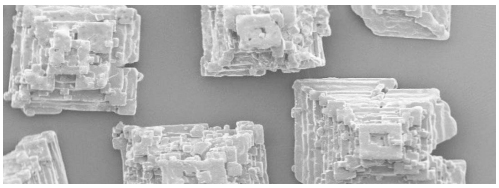
Salt Types

Table salt, NaCl, is found in seawater, salt lakes or rock deposits.

- Salt was once very valuable as a commodity.
- Iodine is now added to salt to minimize goiter (a disease of the thyroid).
- Salt is still a big business. Below are images of salt crystals obtained by various processes.
- Mined rock salt from sedimentary deposits.

- Sea salt produced by evaporation of sea water

- Special flake french-fry salt produced by boiling brine that is pyramid shaped



NaCl is only one kind of salt

- A salt is made up of a positive ion from a base and negative ion from an acid.
- Salts are found in many things
    - In batteries, explosives and fertilizers
    - In multivitamins
    - In many living cells

Honey

Honey is a solution of two sugars namely glucose and fructose. The glucose and fructose are in higher concentrations than are soluble in water so the solution is supersaturated. This means that the solution can form crystals and this is the reason your liquid honey begins to solidify. Varieties of honey with a high glucose content are more likely to crystallize. This is because glucose is less soluble in water than fructose and so it crystallizes more easily.

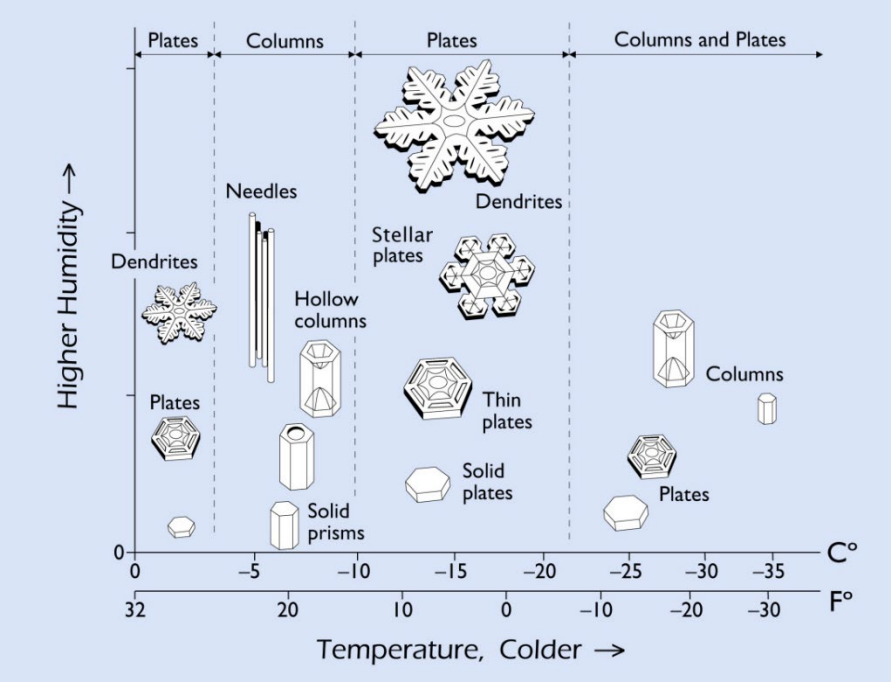
The melting point of honey crystals is between 40^0 C - 50^0 C so putting your crystallized honey into a bowl of warm water will get it back to a liquid state. Just don't get it too hot or some of the special nutrient molecules in your honey will be damaged.

Snowflakes

I think we have all heard that no two snowflakes are the same. Below is some information to help you decide if this statement is true.

Snowflakes are ice crystals of many different shapes that form in clouds.

The different types of snowflakes that form are dependent on the humidity and temperature in which the ice crystals grow. Research on how humidity and temperature affects ice crystal formation was done in the 1930's by Ukichiro Nakaya in his refrigerated snowflake laboratory. His Snow Crystal Morphology Diagram or Nakaya Diagram is shown below. From this diagram you can determine the types of snowflakes produced in clouds based on temperature and humidity. In a nutshell, ice crystals form more quickly



with higher humidity (more water in the air) and temperature affects the types of crystals you get with the largest crystals forming around.

To look at images of snowflakes or videos of them forming please visit professor Kenneth G. Libbrecht snowcrystals.com site. He does research and teaches at Caltech and was the snowflake consultant for the movie "Frozen".

Meet the Scientist Behind “Frozen’s” Snowflakes: https://youtu.be/k0canuRhwHs

Crystals

1. Name four examples of common crystals.

2. List the most common shapes for crystals.

3. Describe three different ways to produce Table Salt or Sodium Chloride.

4. What are the two main factors that determine the type and size of snowflakes? Which conditions will produce the largest snowflakes? Explain.