

Mineral Uses and Formation

Crystal Formation

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SUMMARY

Crystals are found in all minerals. When the atoms in a mineral arrange in an orderly pattern, a crystal forms. This process is called crystallization. Crystals form in two ways.

- Crystals are solids in which the atoms are arranged in an orderly, repeating, 3-D pattern. There are six basic shapes of crystals:
 - Cubic
 - Hexagonal
 - Tetragonal
 - Orthorhombic
 - Monoclinic
 - Triclinic
- These shapes are geometric. Therefore, all crystals display some sort of symmetry.
- Crystals form in one of two ways:
 - Evaporation causes crystallization
 - The cooling of molten material causes crystallization

Crystallization through water evaporation

- Water usually has many substances dissolved in it.
- When a substance dissolves, it means it is broken apart into the smallest parts that are still that substance. For example, if we dissolve salt in water, it will break down the large chunks of salt into smaller pieces of salt. The salt doesn't disappear!
- When the water evaporates, the dissolved salt can begin to crystallize (arrange in an orderly, repeating, 3-D pattern).

Crystallization the cooling of molten material

- Molten material (molten rock) is a term used to describe both magma and lava.
- Magma is found within the earth and lava is found at or above earth's surface.
- All the atoms needed to form minerals can be found in molten material.
- As the molten material cools, the atoms crystallize (arrange in an orderly, repeating, 3-D pattern).

The relationship between crystal size and time.

- In general, the longer a crystal has to form, the larger it will be.
- This is not always true:
 - If a crystal runs out of space to grow into, it will stop growing.
 - If a crystal no longer has a source of atoms, it will stop growing.

- With those two exceptions, the rule remains true!
- Magma will form larger crystals. Magma takes much longer to cool because it is inside the earth. Magma also has a large supply of minerals the crystal uses to grow. Therefore, it will have more time to grow and it will be large.
- Lava will form smaller crystals. Lava cools very quickly because it is exposed to the earth's atmosphere and oceans. The atoms a crystal needs to grow are limited. Therefore, it will have less time to grow and the crystals will be small.
- **NOTE:** Crystals are not alive! When we say "grow" we are mean to say they are becoming larger. This is a result of the atoms bonding. The crystal is not grabbing, eating, or searching for the atoms. Think of snow: is snow alive? No. But as more snow falls what happens: the snow gets deeper.