Minerals & Textures

Chapter 5

Minerals that form in all rocks have a specific definition in geology. **A mineral is a naturally occurring, inorganic solid that has a definite chemical composition and crystalline structure.** This is the definition used by geologists for minerals.

- **Naturally occurring:** A mineral must occur naturally in the Earth. Diamonds, rubies, sapphires and topaz are all naturally occurring gemstones that are found in metamorphic rocks.
- **Inorganic:** A mineral cannot come from living materials. Coal and organic limestone are examples of rocks from living organisms.
- **Definite chemical composition:** Some minerals such as gold, silver, and copper are examples of single element minerals. Graphite and diamonds are made of carbon. The way they combine creates two very different minerals. Minerals made up of two or more elements are compounds. Quartz, silicon dioxide SiO_2, is a compound mineral.
- **Crystal shape:** A mineral's crystalline shape develops when atoms combine to create a molecule. Molecules combine with other molecules repeatedly. The patterns formed by the molecules are the crystal's structure

Index minerals

Metamorphism often causes chemical changes to the minerals that were contained in the rocks before they metamorphosed into a metamorphic rock. Index minerals are used to determine the grade of a metamorphic rock.

Clay minerals subjected to low temperatures recrystallize into **chlorite**. Chlorite will recrystallize into other minerals as the temperature rises. This is an indication that a metamorphic rock that contains chlorite has undergone low-grade metamorphism and the rocks with this mineral are used as an index for low-grade metamorphic rocks.

Sequence of index minerals

Highest grade to lowest grade index minerals

- Sillimanite
- Kyanite
- Andalusite
- Garnet
- Biotite
- Chlorite.

This is the sequence of index minerals that begin with clay minerals in slate and end with gneiss rocks.

Garnets are index minerals

The minerals recrystallize forming higher-grades of metamorphic rocks when the temperature and pressure increases. This causes index minerals to recrystallize in specific grades of metamorphic rocks.

Creating Minerals

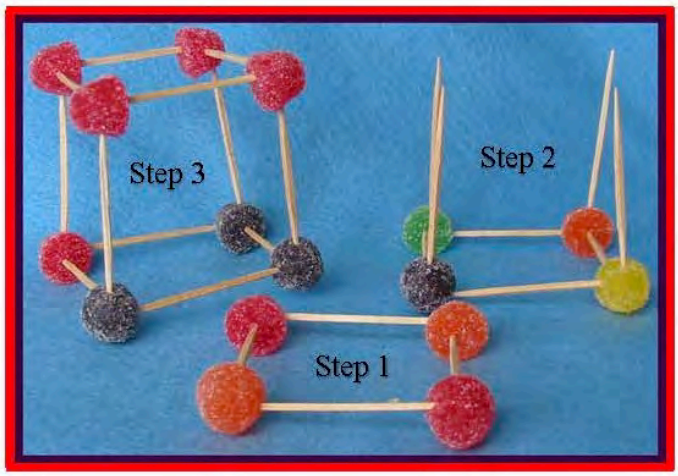
Activity 5

Background information

Minerals are created when a small crystal form and grows into a mineral. The mineral increases in size as the individual crystals that make up the mineral are repeated over and over. In this activity you will create a small crystal. The crystal will grow as you add more small crystals until you have a very large crystal that contains the same structure as it grew.

Materials

- Spice drops
- Toothpicks



Directions

1. Step 1 create the bottom layer by joining together 4 spice drops with 4 toothpicks.
2. Repeat Step 1 for the top layer.
3. Step 2 Place a toothpick in each corner of the square so you can add the top layer of spice drops to the crystal.
4. Join the four sides together so they form a cube.
5. Create a second crystal using Step 2 for the design.
6. You only need to create 3 sides for the second crystal because you will use one of the sides of the original crystal for the fourth side.
7. Create your second crystal.
8. When creating this crystal, it is easier if you set your first box on a flat surface and add the second crystal on one of the sides.
9. Keep adding crystals until you have used all your spice drops.

More science activity ideas

- Create an equilateral triangle. Increase the size of the mineral so that all the minerals are equilateral triangles.
- Research crystal systems and create a crystal out of spice drops for each crystal system.

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