

## 11. Fluorite (calcium fluoride or CaF)



Fluorite, commercially called fluorspar, is mined from deposits in sedimentary rocks around the world. The US and England had considerable reserves, but most world production comes now

from enormous deposits in China. Fluorite has a very important commercial use as a flux in the making of steel and aluminum. Flux is used as a flowing and impurity-cleaning agent. This use consumes the majority of world production. The remainder is used in the chemical industry to produce fluorine, which is then used to produce hydrofluoric acid (HF) for industrial purposes and also to fluoridate water, which prevents cavity formation in teeth.

### Activities:

**K-1:** Fluorite is usually blue, green, yellow, or clear. It makes cubic crystals, the six sides of which look like squares, like a dice cube or a wooden toy block. Draw four squares, and color them different colors like fluorite.

**2-4:** Many communities add fluoride to the water that comes out of the tap. When you drink that fluoridated water or eat food cooked with it, the fluoride content helps prevent cavities. For the same reason, there is also fluoride in many brands of toothpaste. Look at a tube of toothpaste in your home or at a store or online retailer. Do you see the word fluoride on your toothpaste tube or box? Circle your answer: Yes No

**K-5:** Fluorite is transparent. Minerals demonstrate three types of light transmission:

- Opaque means that light does not pass through it. A piece of steel is opaque because no light passes through it.
- Translucent means that light passes through but not detailed shapes. Wax paper and a single layer of facial tissue or tissue paper allow light to pass through, but you cannot see images from the other side.
- Transparent allows light to pass through and you can see images from the other side. Ordinary window glass and water are transparent.



## 11. Fluorite continued

Find one example of each type of light transmission in your home and write or draw your answers:

Opaque

Translucent

Transparent

**6-8:** Fluorite is used in some optical microscopes because of its index of refraction, which is the ability of a material to change the direction of a beam of light. The higher the index of refraction, the more a beam of light changes direction. You can demonstrate the index of refraction with a glass pitcher or vase full of water and a pencil. Hold the pencil halfway into the water. Look through the pitcher from the side at the pencil above and below the water. Describe anything unusual you notice about the pencil:

\_\_\_\_\_.

**9+:** Fluorite crystallizes in the isometric crystal system, which means that all three axes (X, Y, and Z) are perpendicular to each other and they are all the same length. This makes fluorite crystallize in cubes or octahedrons, which look like two four-sided pyramids joined at the base. Sketch this structure in 3D:

For a crystal with an octahedron structure of two four-sided pyramids joined at the base, how many crystal faces are there? \_\_\_\_\_.

What is the shape of the crystal faces on the octahedron? \_\_\_\_\_.