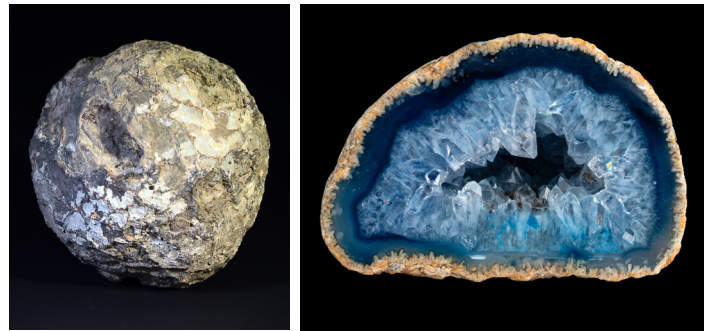


Goldie at Home: Innovative Iowans

Activity Overview: Did you know that Iowa has a state rock? As we commemorate Iowa's upcoming 175th anniversary of statehood, the [Innovative Iowans program](#) will explore Iowa symbols from rock to tree, and everything in between. This activity has young historians creating colorful geodes using eggshells.

Connection to Iowa History

The Iowa General Assembly declared the geode as the state's official rock in 1967 after nine state representatives from southeast Iowa brought the idea forward. Although geodes can be found around the world, the area surrounding Keokuk, Iowa, is well known for producing the glittering rock. Iowa geodes are typically circular and small in shape and usually have a center of quartz crystals. If you are looking to find some geodes in nature, head to Geode State Park outside of Burlington.



Science of Eggshell Geodes

The science behind this experiment is the creation of a saturated solution after the boiled water cools. As the water is boiled, it can saturate more of the Borax since the water molecules are farther apart. As it cools, the water molecules move closer together, which means the Borax will re-crystallize. As one particle settles, more of the particles will join to form bigger crystals.

Instructions ([Video Instructions Available](#))

- 1 **Prepare.** Set out the five plastic cups in a place where they will not be disturbed.
- 2 **Crack.** Gently tap one side of the egg on a flat surface in order to keep one half of the eggshell intact. Open the shell and remove the egg yolk and white. Rinse the intact shell and let dry.
- 3 **Boil.** With an adult, boil four cups of water.
- 4 **Mix.** Once boiling, stir in the Borax until it dissolves in the boiling water. Note that a small amount of the Borax will not dissolve in the water. This is ideal.
- 5 **Pour.** With an adult, slowly pour $\frac{3}{4}$ of a cup of the borax mixture in each plastic cup.
- 6 **Color.** Quickly add food coloring to each plastic cup. Be creative and come up with some fun color combinations for your geode.
- 7 **Add the shell.** Next, carefully add one eggshell to each plastic cup while the borax mixture is still hot. Make sure the inside of the eggshells are facing up to ensure the liquid gets inside the shell cavity.

Materials

- 5 plastic cups
- 5 eggs
- 4 cups boiling water
- 1 $\frac{3}{4}$ cups Borax powder
- Food coloring

Instructions continued on next page

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Instructions continued

- 8 **Cool.** Set the plastic cups aside overnight (8 to 12 hours) to allow the crystals to grow. Do not disturb the cups during this time.
- 9 **Examine.** After the resting period, the eggshells should have crystal growth. Remove the eggshells from the cups and allow them to dry on paper towels. The shells will be delicate, so handle carefully. If there is any remaining liquid, carefully pour it out and throw away the cups.
- 9 **Share!** If you would like to share your creation with the State Historical Museum of Iowa, please email photos to museum.education@iowa.gov. We want to share your creation with other young historians!
- 10 **Questions to Spark Learning**
 - Iowa chose the geode as the official state rock. Do you think it should be a different type of rock? If so, what do you think it should be?
 - Do you think states should have official symbols like rocks, trees and even desserts? Why are official symbols important for a state's identity?
 - Geodes are famous for their crystal centers. After a little research, describe how these crystals are formed in nature.
- 11 **Additional Resources**

Explore these resources below to learn more about Iowa geology and the state's symbols.

 - [Iowa Geological Society - Iowa's State Rock Brochure](#)
 - [Iowa Official Register - State Symbols of Iowa](#)
 - [Keokuk, Iowa - Keokuk Geodes](#)
 - [Iowa DNR - Geode State Park](#)