

Activity 2.1

Curious crystals

Can you identify an unknown crystal by comparing its appearance to other known crystals?

In this activity, students will carefully look at four known household crystals. After observing and describing the crystals, students will be given an unknown crystal, which is chemically the same as one of the four known crystals but looks different. When students realize that they cannot identify this crystal by its appearance alone, they will suggest other tests and ways to compare the crystals to eventually identify the unknown crystal. The other activities in this investigation are examples of tests students can conduct on the crystals. After a series of these tests, students will gather enough evidence to identify the unknown crystal.

Materials needed for each group

Salt	Black construction paper, ½ piece
Epsom salt	Magnifier
MSG (Accent®)	Masking tape
Sugar in cup	Pen
Kosher salt in cup (unknown)	Plastic spoon
5 Small cups	

Notes about the materials

- Be sure you and the students wear properly fitting goggles.
- The piece of black construction paper, and crystals poured on it, will be used in both *Activities 2.1* and *2.2*.

Preparing materials

- Use a permanent marker to label five small cups **salt**, **Epsom salt**, **MSG**, **sugar**, and **unknown**.
- Place at least 2 teaspoons of each crystal in its labeled cup.
- These source cups and crystals will be reused in *Activities 2.2* and *2.3*.

Activity sheet



Copy *Activity sheet 2.1—Curious crystals*, pp. 79–81, and distribute one per student when specified in the activity.

Assessment

An assessment rubric for evaluating student progress during this activity is on pp. 108–109. For this formative assessment, check a box beside each aspect of the activity to indicate the level of student progress. Evaluate overall progress for the activity by circling either “Good”, “Satisfactory”, or “Needs Improvement”.

Activity 2.1

Curious crystals

Question to investigate

Can you identify an unknown crystal by comparing its appearance to other known crystals?

Take a closer look

1. Have students read the introductory story on *Activity sheet 2.1* and examine the crystals.



Introduce students to the four household crystals they will be examining. Then have students follow the procedure below and record their observations about the crystals on the activity sheet. Let students know that they can look at the crystals and touch them but they should not taste them!

Procedure

1. Use masking tape and a pen to label four corners of a piece of black construction paper: **sugar**, **salt**, **Epsom salt**, and **MSG**. Label the center **unknown**.
2. Place small samples of Epsom salt, table salt, sugar, and MSG on the labeled areas of the construction paper.
3. Use a magnifier to look carefully at each type of crystal.
4. Describe some characteristics of each crystal. Include any similarities and differences you notice among them.



2. Have students discuss their observations.

Students should describe physical properties such as the size, shape, color and texture. They should also describe whether the crystals are shiny, dull, transparent, or opaque.

Try this!

3. Introduce the “unknown crystal” and have students compare it to the four known crystals.

Give students a sample of the unknown crystal and tell them that this unknown is chemically the same as one of the other crystals they just looked at. Have them compare this unknown to the others as described in the following procedure.

Procedure

1. Place a sample of the “unknown crystal” in the center of your piece of black construction paper.
2. Use a magnifier to help you compare this crystal to each of the four crystals you just examined.



4. Discuss student observations.

Expected results: The unknown will not look identical to any of the other crystals.

Ask students for their ideas about what the unknown might be based on the way the crystals look. (Don't tell students yet that the unknown is coarse kosher salt.) Ask students to identify crystals they think the unknown might be. Then ask them how certain they are that this is the identity of the unknown. Students should not have enough evidence to correctly identify the unknown at this point.

What's next?

5. With the whole class, have students suggest tests they could do that might help them identify the “unknown crystal”.

Tell students that the appearance test did give some information about the crystals, but not enough to identify the unknown. Ask students for their ideas about other tests they could conduct that might reveal the identity of the unknown. One example of a test would be to crush each type of crystal to see if the unknown breaks in a way that is similar to one of the known crystals. Students might also suggest dissolving each of the crystals in water. Perhaps the unknown will dissolve as much as one of the known crystals. Tell students that in the next few activities they will help design tests and gather evidence to discover the identity of the unknown.