You’re Cooking Crystal What?!
The *Breaking Bad* Lab

**Introduction**:

 Many solids that exist are shaped in ordered, repeating, three-dimensional structures. These are called crystals. Their shapes reflect the arrangement of particles within the solid. These crystals are held together by strong molecular, attractive forces. Ionic compounds have relatively strong attractive forces in comparison to covalent compounds, thus giving them interesting properties, such as high melting points. As previously mentioned, sometimes solids are arranged in repeating patterned structures. These repeated patterns are known as lattice structures, and can be seen in many common salts, such as sodium chloride. On the other hand, other solids do not have an ordered internal structure. These are known as amorphous solids, glass being the best example of an amorphous solid.

**Purpose**:

To observe the various shapes that are possible of solid compounds

**Materials**:

* Goggles
* Distilled Water
* Pipette
* Petri Dish
* Scooper
* Salt
* Hot Plate
* Tongs
* Dissecting Microscope
* Masking Tape

**Procedure**:

1. Fill the pipette completely with distilled water, and place the water into the petri dish. Do this five times.
2. Using the scooper, take 2-3 scoops of your designated salt and place them into the petri dish. Agitate the petri dish to make sure the salt is as mixed as completely possible.
3. Place the petri dish mixture onto the hot plate, and turn the plate on to the highest setting and allow the mixture to sit. This allows some of the water to evaporate.
4. Once the mixture begins to boil, use the tongs to carefully remove the petri dish from the hot plate. Place the petri dish onto the lab table and allow time to cool. While this cooling process is happening, observe what is happening inside the petri dish.
5. Once the petri dish is cool, place it underneath the dissecting microscope, and adjust the lens to see the finished product up close. Record your observations.
6. When the petri dish has cooled, use the masking tape to mark it, since you will be observing it tomorrow.

**Pre**-**Laboratory** **Questions**:

1. Why are safety goggles necessary in this experiment?
2. How do the crystalline structures of solids influence their physical properties?
3. What does it mean to have a “lattice structure?”
4. What is the difference between a crystalline solid and an amorphous solid? Give one example of an amorphous solid.
5. Why do ionic solids tend to have higher melting points than molecular solids?

**Data** **and** **Observations**:

 Compound: \_\_\_\_\_\_\_\_\_\_\_ Initial Observations: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 As you the petri dish cools after heating, what is happening inside of it?

 When placed under the microscope, draw what you see in your petri dish:

 After 24 hours, repeat this process. In addition, draw the products of three other groups’ crystals. Noting what salt they were using.

After 24 Hours

\_\_\_\_\_\_\_\_\_\_ crystals

Group \_\_\_

\_\_\_\_\_\_\_\_\_\_ crystals

Group \_\_\_

\_\_\_\_\_\_\_\_\_\_ crystals

Group \_\_\_

\_\_\_\_\_\_\_\_\_\_ crystals

Your Group

**Post-Laboratory Questions**:

1. How did your crystals look right after cooling your petri dish? How were the different 24 hours later?
2. Did the shapes of the crystals look the same for each group you went to? Why do you think that is?
3. Your crystals are small, but in caves like Lechiguilla (from Planet Earth: Caves), the crystals are several stories tall. Why do you think there is such a huge difference?
4. How does boiling point differ from evaporation? What do they have in common?
5. What is one way to tell your solution is evaporating? Why, on a molecular level, is this evaporation happening?
6. When the solution is evaporating, you will see the sides of the petri dish begin to fog up. What is this “fog” on the sides of the petri dish, and why does it form?
7. If this experiment was done at a higher elevation, explain why this experiment would be slightly different.