



Growing Single Crystals

Day 1

1. Measure amount of water it takes to fill jar $\frac{3}{4}$ full. Record the volume in mL.
2. Determine amount of chemical needed to make a supersaturated solution.

Copper sulfate (CuSO_4) = mL of water \times .43 g/mL

Potassium alum = mL of water \times .16 g/mL

Record the mass in grams.

Describe appearance of chemical.

3. Mass the proper amount of chemical into a 100 - 150 mL beaker using a balance.

Define the term "tare" in your journal.

4. Add the amount of water from step #1 to the beaker.
5. Use a hot plate to heat the contents of the beaker until all of the chemical is dissolved. Stir as you heat.
6. Pour a small amount of the solution into a watch glass. Place remaining solution into your jar and loosely cap. Record observations.

Day 2

1. Select a seed crystal from your watch glass. Cut 20 - 25 cm of thread and use it to tie a knot around the seed crystal. Draw and describe the seed crystal in your journal.
2. Run the thread through the hole in the jar lid and tape it down so that the seed will suspend in the middle of the solution.
3. Clean the seed crystal and thread by gently and quickly dipping them in a beaker of water a couple of times.
4. Suspend the seed crystal in the jar of solution.



Journaling for Day 2:

- Look at your watch glass under a stereoscope and find examples of each of the following:
 - single crystal
 - grains
 - grain boundary
- Make a labeled sketch of each of these structures.
- Choose a seed crystal - sketch it actual size and mass it.

Day 3+

1. Check the crystal daily. Record observations, sketches, and describe "maintenance" techniques used.
2. If crystals appear on bottom of jar - reheat the solution to re-dissolve the chemical. Use a beaker. Allow solution to cool before replacing the crystal.
3. If extra crystals grow on the suspended crystal or thread try to remove them.
 - use forceps
 - dip in water
 - ????????
4. If the crystal stops growing, re-supersaturate the solution. Add 2 or 3 grams of chemical for each 100 mL of solution and reheat in a beaker to dissolve. Let solution cool before replacing the crystal in solution.

Final Journal Write

Write a final summary and reflection using paragraph form. The following bullet items are to be discussion points in your writing. They do not have to be in the order listed but all must be answered somewhere in the paragraphs.

- Discuss problems you encountered in growing a SINGLE perfect crystal and remedies you tried.
- Why does the crystal eventually stop growing? How can you fix this?
- How many times did your crystal increase in mass?
- How well did your crystal keep a perfect shape?
- What have you learned? (about solutions, about crystals, etc...)
- What questions do you still have about crystals and/or crystal growth?
- What would happen if you placed a potassium alum seed crystal in a supersaturated CuSO_4 (copper sulfate) solution? Why?
- What is your opinion of this lab? What did you enjoy the most? What did you like the least?
- Include a drawing of your final crystal.

Note: $3\frac{1}{2}$ oz. plastic cups, toothpicks, and plastic wrap can be used instead of glass jars with lids.