Name: _____Date: _____ Period: 1 2 3 4 5 6 7

Growing Crystals

Crystals are the building blocks of rocks. They form when minerals solidify into regular shapes with flat, often shiny faces and sharp edges. In rare conditions, exceptionally beautiful and hard-wearing crystals form in igneous or metamorphic rock to become gemstones. The element carbon can crystallize into a diamond, the most precious jewel of all, and the mineral corundum and beryl can form rubies, sapphires, and emeralds. Gemstones are highly prized for their beauty and rarity. You are unlikely to find any when rock hunting, so why not try making a fake!? Combine your Chemistry knowledge and Earth's Structure knowledge as we grow a "diamond" in the classroom.

Objectives:
To investigate what is a solution and how temperature and particle size affects solubility

Materials:

Hot water
Crystal seed
Aluminum Potassium Sulfate (Alum)
Glass Beaker
String
Petri Dish
Stirring Rod
Safety goggles
Gloves
Tweezers
Pencil

Are Diamonds Forever?

Diamonds are famous for the way they sparkle. A cut diamond reflects more light than other gems and splits the light into colors, giving the diamond its "fire". They are also famous for being the hardest substance known-no other mineral can scratch them. But they're far from indestructible. Like coal and other forms of carbon, they can burn.

Teacher Demo and Student Set-Up Day 1

1. Pour 60mL of hot water (55-60 degrees Celsius) into a beaker and add 20 grams of alum. Stir the solution with a stirring rod until no more alum will dissolve.

2. The teacher will add a small layer of the solution to three Petri dishes. The teacher will leave the dish in a warm place and cover it. Alum crystals will form quickly on the bottom of the dish as the liquid cools. Allow time to sit overnight.

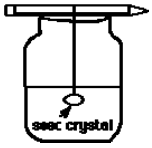
Day 1 Questions

1. Did your teacher make a solution, solvent, saturated or super saturated solution today? How do you know?

Teacher Set-Up Day 2

1. Pour 180 mL of hot water (55-60 degrees Celsius) into a beaker and add 60 grams of alum. Stir the solution with a stirring rod until no more alum will dissolve.

Student Lab Day 2



1. Carefully remove one of the largest crystals with tweezers. Tie a piece of string around it and wrap the string around the middle of a pencil. Use tape to secure the pencil and string if necessary.

2. Send a student from your group up to the front of the room to pour 5-6 mL of dissolved Alum your teacher set-up into your beaker. Choose a gem color if you desire, red to make a Ruby, or green to make an emerald. Use approximately 1 drop. Then place the pencil on top and hang down the string with the crystal being suspended in the solution.

3. The crystal will grow slowly. Record observations below.

Chemical Colorings

The colors of gems often come from chemical impurities, just as your home-grown crystals are colored by additives. Rubies and sapphires are both varieties of the mineral corundum, which is colorless when pure. Rubies get their red from chromium, while sapphires are colored various colors by iron and titanium.

	Day 1	Day 2	Day 3
Observations/ Sketches			

Day 3

1. Today you will mass your final crystal to compete with your classmates! Who grew the largest crystal?

Mass of final alum crystal _____g

Rock Matching

1. Igneous _____ A. degree of crystallization depends on the conditions in which they solidified (cooled slowly or rapidly)

2. Metamorphic _____ B. re-crystallized with high temperature and pressure

3. Sedimentary _____ C. deposited from aqueous solution

Conclusion Questions

1. On a scale of 1-10, with 10 being the best rate your crystal in terms of a. shape ___ b. clarity ___c. size ___

2. What measures could you have taken to improve the shape?

3. What measures could you have taken to improve the clarity?

4. What measures could you have taken to improve the size of the crystal?

5. Explain, on a particle level, how a crystal forms from the evaporation of a saturated solution.