Crystal Formation Lab Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Background Info:**

Rocks on Earth are formed from material, which comes from Earth’s mantle, in addition to smaller fractions coming from space (as meteorites), living organisms, or as fragmented pieces of other rocks. Igneous rocks make up most of Earth’s crust; sedimentary and metamorphic rocks are derived by various methods of reworking igneous rocks. Since we are interested in the properties of the majority of Earth’s crust, to understand the composition of Earth’s crust we will focus our attention on igneous rocks.

**Purpose:**

Igneous Rocks are classified primarily on the basis of their texture (crystal sizes) and composition (mineral content). Cooling Rate and Crystal Size: As we are learning how to identify igneous rocks, we will demonstrate how the rate of cooling affects the size of mineral crystals. We will use a heated mixture of Epsom salt and water (representing magma) and cool samples of this solution at three different rates.

**Materials:**

Glasses or Goggles

Heat Source- Careful, it gets hot!

Beaker

Epsom Salt in bowl with spoon

Stirring Rod

Beaker Tongs

3 Test Tubes and Test Tube Clamp

Funnel

Masking Tape

**Predict:**

Predict how crystal size relates with the rate of cooling.

1. By cooling our solution in warm water, how will that affect crystal size?

2. By cooling our solution in cold water, how will that affect crystal size?

3. By cooling our solution in the test tube rack at room temperature, how would that affect crystal size?

**Experiment: DO NOT HEAT WATER TO THE POINT OF BOILING. IF IT IS BUBBLING, IT’S TOO HOT.**

1. Label each test tube with your group’s initials and where the test tube is going. (Warm water, Rack, or Cold Water)

2. Put around 100 mL of water into your 250 mL beaker.

3. Start to heat the water on a heat source.

4. Once you see water start to create steam but NOT boil, start adding scoops of salt into your warm water. Every time you add a scoop of salt, make sure you stir the solution well with the stir rod.

5. Keep adding salt, scoop-by-scoop until you can constantly feel grittiness on the bottom of the beaker with your stirring rod. Let solution heat for a few more minutes and then feel again to see if grittiness is still present.

a. If gritty feeling is gone, return to adding scoops of salt.

b. If gritty feeling is still there move on to step 6.

6. Congratulations, your solution is now super-saturated.

7. Turn off heat source! You need to use the beaker tongs to carefully pour your solution into 3 different test tubes using the funnel. Fill test tubes until they are about half full and hold them with the test tube clamps. I would stir the beaker solution each time before pouring.

8. Place the test tubes in the correct place.

9. Unplug hot plate, dump remaining solution into sink and rinse out beaker with water.

10. Return the materials to your lab table.

**Observe & Analyze:**

1. Look at your test tubes and draw a sketch of what the crystals look like in each test tube.

Warm: Room: Cold:

2. Which crystals formed the largest size?

Explain why you think that happened.

3. Which crystals formed the smallest size?

Explain why you think that happened.

4. Which crystals would have formed deep underground? What type of igneous rocks are these?

5. Which crystals would have formed on the earth’s surface? What type of igneous rocks are these?

6. Which crystals would have formed in between the surface of the Earth and deep underground, maybe in the middle?

**Formulate:** How would you change this lab to create even larger crystals?

**Conclusion:** Summarize in detail what your lab has taught you about crystal size in intrusive and extrusive igneous rocks.