Lab: Cooling Magma and Lava **name:** _____

Pre-Lab Questions

1. Sperm cells, egg cells, and embryos can be frozen, stored for several years, and then thawed for use. On the other hand, a human will not be able to "come alive" after it has been frozen. Explain.

2. When you examine igneous rocks, how can you determine whether the rock was formed from magma that cooled beneath the Earth's surface, or from lava that cooled above the surface?

Procedures: Obtain the materials listed on the board.

1. Salol is harmful to your eyes and skin. You will need to wear goggles until you are done heating the salol. Put them on now. Do not taste the salol.

2. Obtain two microscope slides from your instructor. Each slide has a small amount of salol. They are also labeled "F" for fast-cooled and "S" for slow-cooled.

3. Set the hot plate temperature to 200. Using clothespins to hold the slides about 1-2 cm above the surface of the hot plate, SLOWLY melt the salol. Be patient!

4. Once the salol is melted, set the one labeled "S" on the countertop. Do not disturb it. Get a piece of ice from your instructor and rub it on the underside of the salol labeled "F" to cool it quickly. You can take your goggles off now.

5. Once the salol on the "F" slide has hardened, look at it through a hand lens. Why would you expect the fast-cooled one to be more like rock formed as lava cools rather than rock formed as magma cools?

6. Would the fast-cooled one be more like a volcanic igneous rock, or more like a plutonic igneous rock?

7. Name the most common type of volcanic igneous rock, and the most common kind of plutonic igneous rock.

   volcanic: plutonic:

8. After the salol on the "S" slide hardens, examine it with the hand lens also. If it hasn't hardened by now, tell Mr. Benson. He will "trigger" the crystallization process by adding a few grains of salol to the liquid on slide "S". Which of the samples on your slides formed larger crystals (longer lines, clearer, larger flat surfaces)? Circle one.

   the fast-cooled one the slow-cooled one

9. Why did the molecules form larger crystals in the sample you chose for your answer to #8 on the previous page? Circle one.

   a. The molecules had more space to arrange themselves as they changed to solid.

   b. They had more time to arrange themselves as they changes from liquid to solid.

Follow-Up Questions

Do not clean the slides. Ask your teacher what you should do with them. Get a tray of rocks and use them to answer the questions below. There should be 5 rocks on the tray (2 granites, 1 rhyolite, 1 porphyry, 1 volcanic glass). Figure out which is which. Ask your instructor if you need help.

1. Which of the rocks was formed as magma cooled very slowly beneath the surface over centuries?

   Circle one: granite volcanic glass rhyolite

2. The appearance of this rock would be described as _____ . Circle one.

   Fine-grained coarse-grained glassy

3. The "grains" in this rock are actually crystals of different minerals. Why did the minerals form grains, rather than crystals with nice flat surfaces and geometric shapes? Circle one.

   lack of time lack of space

4. According to the page 72 of your text (p. 57 of honors text), how does obsidian get such a glassy texture? Use sentences to answer this question.

5. Which of the rocks on your tray was formed as lava cooled above the surface? Circle one.

   rhyolite granite

6. How would you describe the texture of this rock (answer to #5)? Circle one.

   fine-grained course-grained

7. Examine the porphyry on your tray. Does it have visible crystals?

8. Explain how porphyry forms? Text page 72 (p. 57 of honors text) will help. Use sentences to provide a thorough explanation IN YOUR OWN WORDS. (2 pts.)

9. Did the larger crystals in the porphyry form when the magma was deeper in the Earth, or when it was near the surface?

10. The mountains between Helena and Butte (Boulder Batholith) are made of rock that formed as magma cooled slowly beneath the surface. Which of the rocks on your tray would be most like the rocks in this region?