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CLASS _____ DATE _____

LAB INVESTIGATION

Volcanic Rocks and Their Formation

Rhyolite, andesite, and basalt are three types of volcanic igneous rocks. The composition of each rock can tell you something about the volcanic conditions under which it was formed. In this lab, you will use graphs to discover the differences among the three samples and then relate each rock to the kind of plate boundary at which it may have formed.

Lab Skills and Objectives

- To **construct** pie graphs for four unknown volcanic rocks
- To **compare** and **contrast** pie graphs for rhyolite, andesite, and basalt with graphs of unknown rock specimens
- To **identify** four unknown volcanic rocks and **classify** them according to the conditions of their formation

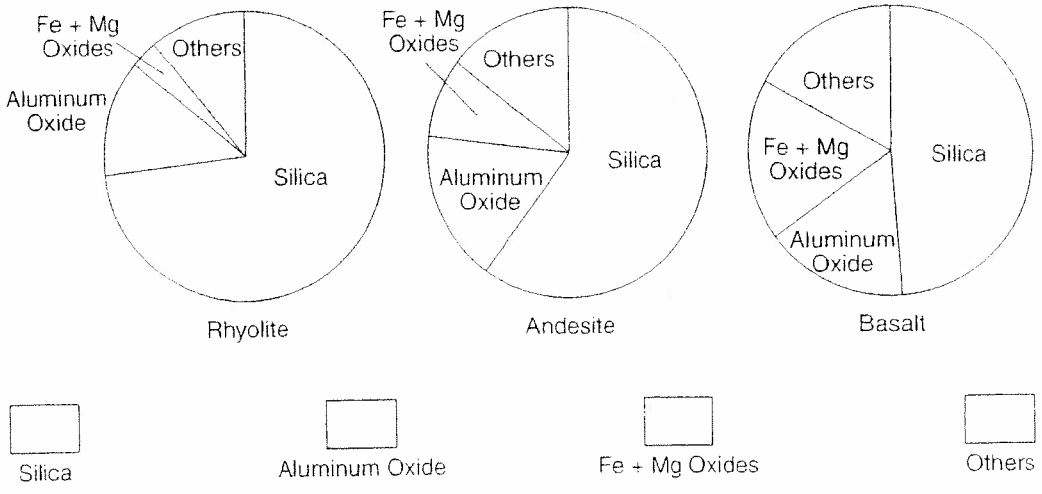
Materials

- specimens of rhyolite, andesite, and basalt identified by number
- colored pencils
- calculator
- protractor
- [illegible]

Procedure

1. On Figure 14.1, use any colored pencil to lightly shade the section labeled *Silica* in each of the pie graphs. Shade the *Silica* box in the key below the graphs. Using a different color, shade the aluminum oxide sections of each pie graph and the key. Using different colors, continue to shade the remaining graph sections and boxes.

Figure 14.1
Pie graphs representing composition of rhyolite, andesite, and basalt.



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Composition	Volcanic Rock 1		Volcanic Rock 2		Volcanic Rock 3		Volcanic Rock 4	
	Percent	Degrees	Percent	Degrees	Percent	Degrees	Percent	Degrees
Silica	49	176	60		49		73	
Aluminum oxide	16		17		13		13	
Fe and Mg oxides	18		9		21		3	
Other	17		14		17		11	
Total	100	360*	100	360	100	360	100	360

*Totals of 359 and 361 are also correct.

Figure 14.3 Compositions of igneous rocks

2. Figure 14.3 shows the compositions of four volcanic rock samples. Note that the amount of each substance contained in the rock is shown as a percentage of the total. To begin constructing your pie graphs, you will first calculate the number of degrees of a complete circle that corresponds to each percentage. (A complete circle is 360°.) For example, 49 percent of Volcanic Rock 1 is silica. Thus 49 percent of the pie graph for Volcanic Rock 1 is silica. 49% of 360° = 0.49 × 360 = 176 degrees. In this way, determine the number of degrees for each of the other percentages. Record your percentages in the spaces provided in Figure 14.3.

3. Using a protractor and your degree data from Figure 14.3, construct a pie graph for Volcanic Rock 1. Use the appropriate circle in Figure 14.2. Start with the silica data and plot it in a clockwise direction from the vertical line. Label each section on the graph as you plot it. Use the same color for each mineral that you used in Figure 14.1 Shade the segments of your pie graph.

4. Repeat procedure steps 2 and 3 for each of the other volcanic rocks.

1. Felsic rocks tend to be higher in silica but lower in iron and magnesium oxides. Which rock in Figure 14.1 (rhyolite, andesite, or basalt) is most felsic? Explain your answer.

_____

_____

2. Mafic rocks are lower in silica but higher in iron and magnesium oxides. Which rock in Figure 14.1 is most mafic? Explain your answer.

_____

_____

3. Felsic rocks tend to be light in color, while mafic rocks tend to be dark. Which rock (rhyolite, andesite, or basalt) should be lightest in color?

_____

Which rock should be darkest?

_____

4. On the basis of color, texture, and appearance, identify your three rock samples as rhyolite, andesite, or basalt.

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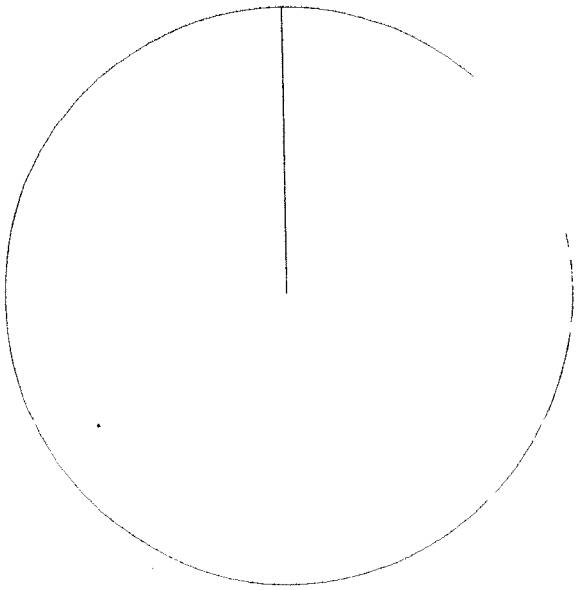
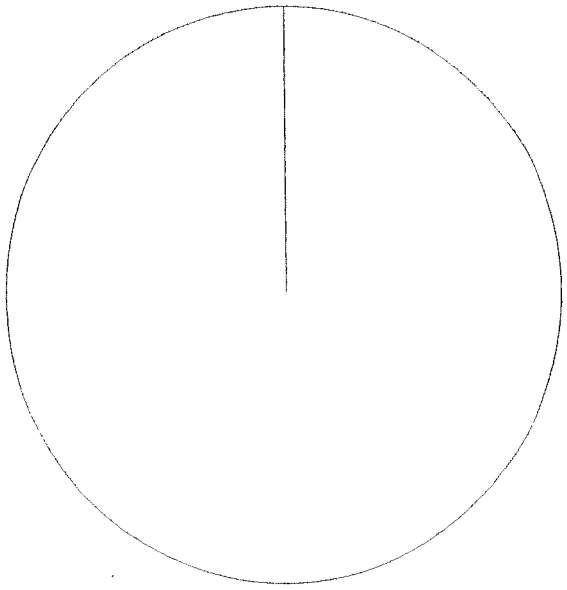
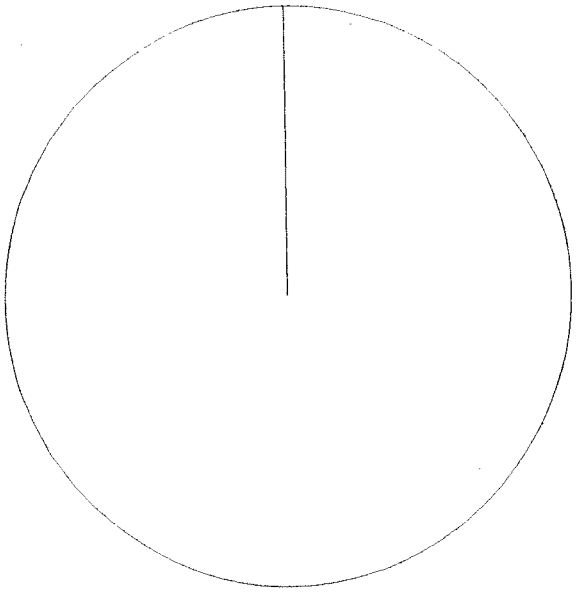


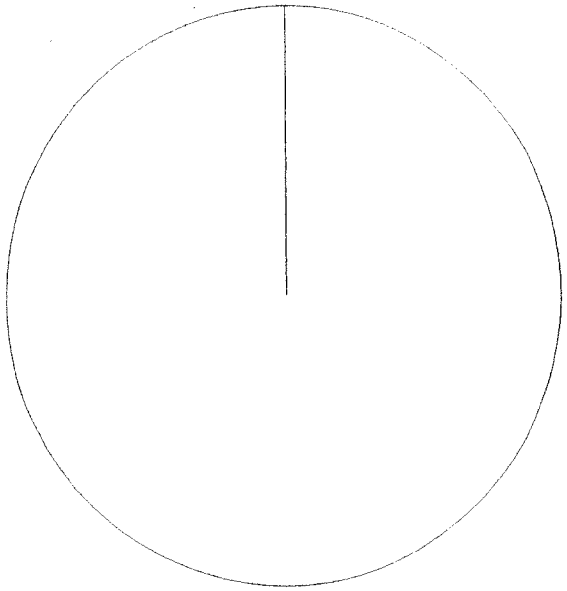
Volcanic Rock 1



Volcanic Rock 3



Volcanic Rock 2



Volcanic Rock 4

Figure 14.2