ESS103A Name_____
Igneous Petrology, Spring 2006

LAB 9
HAWAII ISLANDS SUITE and CONTINENTAL ALKALINE ROCKS

The Hawaiian Islands are the tops of generally basaltic volcanoes that rise above sea level, and include the largest volcanoes on Earth. These immense volumes of erupted magma result from intense mantle melting caused by a rising and stationary plume or hot spot. Heat from the hotspot produces a persistent source of magma by partially melting the overriding Pacific Plate. As the Pacific Plate moves westward, a new volcano is constructed above the stationary plume. The newest volcano, Loihi, is located just offshore of Hawaii, but has yet to rise above sea level. Despite the overwhelmingly basaltic composition of the Hawaiian magmas, significant compositional diversity does exist. Each volcano characteristically passes through initial stages of alkalic and tholeiitic basalt eruptions that form large volcanic shields, and terminate in the eruption of more evolved, more-viscous, and more-alkaline magmas that often form scoria cones and lava domes. However, the Hawaiian rock suite is not unique, and the same rock associations are found in many other oceanic islands and in other tectonic settings such as continental interiors.

1. Describe and classify the following samples using page one of the three-page worksheet:

Shield Stage

1) **L-11-96**
   Prehistoric lava, Mauna Loa, Hawaii
2) **97KC20**
   A.D. 1959 Kilauea Iki lava lake, Hawaii
   (There is no thin section. Only provide a hand sample description and field name.)

Post-Shield Stage

3) **HI-9012**
   Lava, Mauna Kea, Hawaii

Post-Erosional Stage

4) L-11-24
Waianae Range, Oahu

a) Look for the following features:

- Crystallinity (holocrystalline, hypocrystalline, holohyaline)
- Size of crystals (aphanitic, phaneritic, porphyritic, microporphyritic, seriate porphyritic, hiatial porphyritic, equigranular, inequigranular)
- Shape of crystals (hypidiomorphic, pandiomorphic, allotriomorphic)
- Reaction rims
- Ophitic (small plagioclase laths enclosed in larger pyroxene crystals) and subophitic (large plagioclase crystals partially enclosed in pyroxene)
- Flow alignment (trachytic or pilotaxitic)
- Mineral assemblages (glomerocrysts)
- Inclusions

Record your observations for the rocks in the summary chart.

2. Study sample **5) HI9019A**. This rock contains a mantle xenolith.

a) Provide a hand sample description and field name.

b) Formulate a hypothesis about how this rock made its way to the surface:

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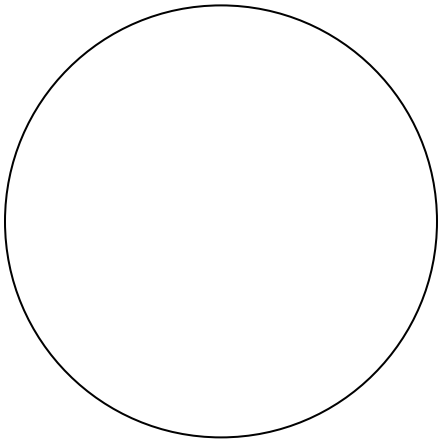
CONTINENTAL ALKALINE ROCKS

3. **L 215-50 (Ne-l)**: This is a Kimberlite from S. Africa.

a) Provide a hand sample description.

b) Which mineral is the dominant phenocryst phase in this sample?

c) Based on the condition (good/bad) of this dominant phenocryst, how do you know that this rock is not a tholeiite? Draw and describe the phenocrysts in the kimberlite.



4. **L-9-12**: This is a lava flow from Mt. Vesuvius.

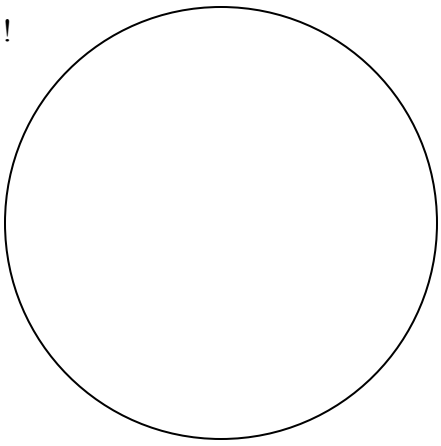
a) Identify the phenocryst phases.

b) Provide a field name after you identify the minerals in thin section.

5. **L 215-9 (Pr-9)**: This is a Carbonatite.

a) What are the major minerals in this sample?

b) Make a thin section drawing and label it!!



Summary Chart

(Lab 5)

	Field Name	Major Minerals	Textural Features	Crystallization Sequence for Ferromagnesian Minerals
1) L-11-96				
2) 97KC20				
3) HI-9012				
4) L-11-24				