

LAB 1

INTRODUCTION TO IGNEOUS PETROGRAPHY

Keep a lab notebook for this course. Use your notebook to write down detailed observations and notes on each sample. This way, your final description tables will be neat and legible, and you can go back and look at your notes for the lab final. The Sample Description Worksheet is 3 pages long, and is available on the class web site. Often (as in this lab) you will use only the 1st page for a brief sample description.

This first lab is designed to (re-)familiarize you with some basic aspects of igneous mineralogy and texture.

1. Summarize the optical properties, physical properties, and occurrences of common igneous minerals (i.e. quartz, olivine, plagioclase, orthoclase, olivine, hornblende, biotite, magnetite, etc.) as you examine them in this lab. Create a database, preferably using a computer worksheet program, which can be printed out and used as a resource during future labs. You can add minerals to the database as the quarter progresses. Turn in a copy of this spreadsheet with the lab.
 - Optical properties in thin section: isotropic/uniaxial/biaxial, 2V for biaxial, optical sign (+ or -), birefringence (δ), cleavage, twinning or exsolution textures, color and pleochroism, methods for estimating composition (Michel-Levy, cpx vs. opx)
 - Hand sample properties: density, color, cleavage, hardness, common occurrences and associations.

2. Study the hand sample and thin section of the following samples:
 1. 214/s-148B
 2. 254/L-2-7
 3. L-11-74
 4. R00LV62

Begin your examination of the rocks by carefully looking at the hand sample. Remember that igneous rocks include both plutonic and volcanic expressions of a solidified magma for a given composition. The first thing you should do is determine if the rock is plutonic or volcanic.

- a) Provide a brief description (only page 1 of the 3-page Sample Description Worksheet) of each sample concentrating on the following:
 - Hand specimen description and field name
 - Major mineralogy of phenocrysts and groundmass (from thin section) and estimate modal %
 - Basic textures (from thin section)

- Thin section drawing
- b) Fill in the attached table that summarizes your observations of each sample.

A general procedure for describing igneous rocks includes observation of the following characteristics:

- Color: leucocratic or melanocratic
- Crystallinity: whether the rock is completely crystalline (holocrystalline), partly glassy (hypocrystalline), or entirely glass (holohyaline)
- Crystal size: equigranular versus inequigranular, range and average crystal size of phenocrysts and groundmass
- Crystal size distribution: equigranular, seriate (continuous range of grain size), porphyritic (-aphanitic, or -phaneritic).
- Mineralogy: minerals present, morphology of the crystals (euhedral, subhedral, anhedral), internal textures (zoning – normal, reverse, oscillatory; resorbed zones; inclusions; fracturing; etc.), composition (e.g., plagioclase An content).
- Textural relationship between crystals: allotriomorphic (most crystals are anhedral), hypidiomorphic (most crystals are subhedral), panidiomorphic (most crystal are euhedral)
- Alteration: e.g., sericitic replacement of plagioclase, olivine to iddingsite, biotite to chlorite

References you will find helpful for this and other labs:

- Chapter 2 and Chapter 3 of Winter
- Any good optical microscopy book (Nesse, Wenk)
- The photocopied reference handouts
- The atlases of minerals and rocks in thin section (full of color pictures of the things you are trying to identify... very useful)

Lab 1 Summary Chart

	Hand Specimen			Thin Section		Plutonic or Volcanic	Rock Name (field)
	Color (leucocratic, melanocratic)	Texture (glassy, aphanitic, phaneritic, porphyritic-)	Visible Minerals	Texture (glassy, aphanitic, phaneritic, porphyritic-)	Major Minerals		
1) 254L-2-7							
2) 214/s-148B							
3) L-11-74							
4) R00LV62							