

GLY261 Practical 3: Volcanic Rocks

Name: _____ **Student Number:** _____

Part 1: Thin section descriptions of volcanic rocks

Take two thin sections of volcanic rock from those offered in the microscope laboratory.

Section 1

1. What is the section label? _____
2. How much glass is present in the section? _____ %
3. What other minerals can be identified, and what is the average size of each crystal?

Mineral 1:	_____	_____ %	Size: _____
Mineral 2:	_____	_____ %	Size: _____
Mineral 3:	_____	_____ %	Size: _____
Mineral 4:	_____	_____ %	Size: _____
Mineral 5:	_____	_____ %	Size: _____

4. Describe the textures of the minerals in the rock:

(You need to describe the shape of the minerals, the minerals they are associated with, and any other special textures)

5. Describe the paragenetic sequence identified in the thin section, and justify your answer with textural observations

6. What is the appropriate name for this rock? _____

Section 2

1. What is the section name? _____
2. How much glass is present in the section? _____ %
3. What other minerals can be identified, and what is the average size of each crystal?

Mineral 1:	_____	_____ %	Size:	_____
Mineral 2:	_____	_____ %	Size:	_____
Mineral 3:	_____	_____ %	Size:	_____
Mineral 4:	_____	_____ %	Size:	_____
Mineral 5:	_____	_____ %	Size:	_____

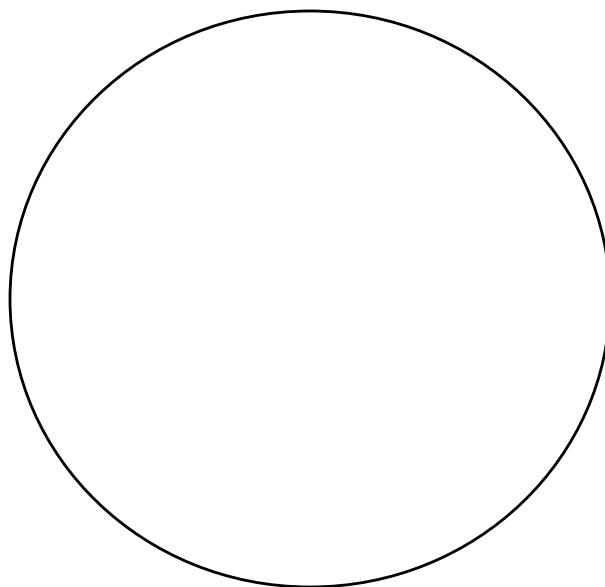
4. Describe the textures of the minerals in the rock:

(You need to describe the shape of the minerals, the minerals they are associated with, and any other special textures)

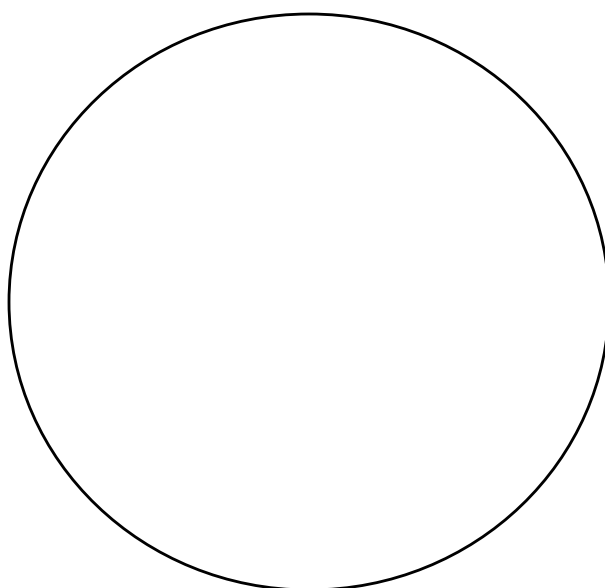
5. Describe the paragenetic sequence identified in the thin section, and justify your answer with textural observations

6. What is the appropriate name for this rock? _____

Section 1 Sketch



Section 2 Sketch



Textural terms for Igneous Rocks- GLY 261 Practicals

Crystallinity: A rock can be composed solely of crystals (*holocrystalline*) or completely composed of glass (*holohyaline*). Rocks of intermediate composition are *hypocrystalline* or *holocrystalline*. Used with **volcanic** rocks

Granularity: *Phaneritic* rocks contain crystals of sufficient size they can be seen in hand specimen (or on the glass slide). *Aphanitic* rocks have crystals that are too small to be seen in hand specimen. Aphanitic rocks can be either *microcrystalline* (crystals can be seen under the microscope) or *cryptocrystalline* (crystals too small even for the microscope).

Coarse-grained:	>5mm
Medium-grained:	1-5mm
Fine-grained:	<1mm

Relative crystal sizes: If all the crystals are roughly the same size, the rock is *equigranular*. If the crystals are of different sizes, the rock is *inequigranular*, and may have one of the following textures:

- 1) A *porphyritic* rock consists of large crystals (*phenocrysts*) embedded in a finer-grained groundmass. Both crystal occurrences can be of the same mineral. The phenocrysts are considered to have formed first, before the groundmass crystallises.
- 2) A *seriate* rock consists of a wide range of crystal sizes, rather than just the bimodal distribution in a porphyritic rock.
- 3) *Glomeroporphyritic* rocks comprise clumps of phenocrysts in a finer groundmass. These clumps are generally of early formed crystals.
- 4) *Poikilitic* rocks consist of crystals that completely enclose other crystals. The enclosing crystal is an *oikocryst*, the enclosed crystal is an *chadacryst*. The enclosed crystal must have been formed before the enclosing oikocryst.
- 5) *Ophitic* texture refers to a variety of poikilitic rock, in which the chadacrysts are generally elongate, but randomly arranged. As above, the chadacrysts form before the oikocryst.

Crystal shape:

Euhedral/idiomorphic crystals show characteristic crystal faces. Generally form early.

Anhedral/allotriomorphic crystals show no characteristic faces. Generally form late.

Subhedral/hypidiomorphic crystals show some characteristic faces.

Equant crystals are roughly the same size in all directions. Generally form early.

Inequant crystals have a distinct shape, with differing dimensions. Examples include, from most equant to least equant:

Tabular or platy
Lamellar
Bladed
Columnar
Acicular or needle-like

Other crystal shapes:

Skeletal crystals have only the skeleton of a crystal, and form during quenching.

Dendritic crystals show a tree-like structure, and form during quenching

Embayed crystals are crystals that appear broken open and intruded into by the groundmass. The early formed crystal has reacted along its edges with a later crystal.

Parallel growth of minerals can occur. This indicates growth in a stress regime.

Other terms

Sieve texture: refers to the intergrowth of glass and crystals in the groundmass, indicative of quenching.

Elongate, branched or curved crystals: can occur in volcanic rocks, or magmas in which flow occurred.

Pseudomorph: Some crystals can be completely replaced by another mineral, leaving the original crystal shape intact.

Interstitial: Some crystals are developed in the spaces between the phenocrysts, with little or no connection between the spaces.

Interstitial crystals grow late in the sequence.

Intergranular: Pyroxene, olivine or other mafic minerals are found in the interstitial spaces between plagioclase or K-feldspar laths.

Cumulus texture, in which feldspars formed first.

Trachytic: Feldspars are arranged in a sub-parallel arrangement.

Exsolution: Lamellae or blebs of one mineral exsolve in another mineral. Ilmenite in magnetite is one example, as is albite in orthoclase.

Spherulitic: Numerous elongate crystals growing outward from a nucleus. Quench texture.

Variolitic: A fan-like structure branching out from a nucleus. Quench texture/

Overgrowths/ Coronas: Another mineral has grown over the top of a previously existing material. The core crystal is thus older than the overgrowth.

Zoning: clear zones can be seen within a single crystal. The central zone is the oldest.

Feldspar-related textures

Granophyric: K-feldspar and plagioclase are intergrown.

Myrmekitic: Plagioclase and quartz are intergrown.

Lamellar texture: blebs or "lamellae" of one type of feldspar are found in another feldspar - *perthitic* texture comprises plagioclase in k-feldspar, *antiperthite* comprises k-feldspar in plagioclase.