

TEXTURES OF IGNEOUS ROCKS

LAB 3 HANDOUT

Source: WWU

Textures are the relationships of crystals and glass at the smallest scale; structures are larger-scale features, often requiring a whole outcrop to fully describe

Crystallinity

This is determined under 10x magnification for hand samples or with 10x objective in microscope

- **holocrystalline**: entirely composed of crystals (no glass)
- **hypocrystalline**: part crystals and part glass
- **holohyaline** = **glassy** = **vitric**: all glass and no crystals

Grain Size

These terms describe the rock for specific minerals in a rock description, you would give measurements in mm or cm. Terms other than “porphyritic” can be applied to the whole rock, or the groundmass around the phenocrysts (but not to individual minerals).

- **aphanitic**: grains too small to see without a microscope, but rock isn't glassy
- **phaneritic**: grains visible with the unaided eye
 - **fine grained**: < 1 mm (average long dimension of grains)
 - **medium grained**: 1 mm: 5 mm
 - **coarse grained**: 5 mm: 3 cm
 - **very coarse grained** = **pegmatitic**: > 3 cm
- **microcrystalline**: holocrystalline, but individual crystals require a hand lens to discern
- **cryptocrystalline**: holocrystalline, but even in the microscope, individual crystals cannot be discerned
- **granular** = **equigranular**: most of the grains are approximately equal in size
- **inequigranular**: grains of significantly different sizes
 - **porphyritic**: two (or more) distinct sizes of grains; consists of larger **phenocrysts** and a finer-grained, aphanitic, or glassy **groundmass**
 - **seriate**: smooth variation in grain size from small to large

Equigranular textures

- Sub-types of “granular”:
 - **panidiomorphic granular** (pan=all; idio=one's own; morph=shape): granular texture in which most of the minerals are euhedral, so they all have their own shapes.
 - **hypidiomorphic granular** (hypo=less or below): granular texture in which some of the minerals are subhedral or euhedral and others are anhedral, so less than all of them have their own shapes.
 - **allotriomorphic granular** (allotrio=alien): granular texture in which all of the minerals tend to be anhedral, so they have shapes alien to their own.
 - **aplitic**: “sugary”: fine grained + hypidiomorphic + equigranular
- **ophitic** = **diabasic**: hypidiomorphic granular with euhedral plagioclase enclosed within anhedral augite
- **subophitic**: like ophitic, but augites only partly enclose the plagioclase
- **intergranular**: euhedral plagioclase surrounded by finer grains of augite
- **trachytoidal**: phaneritic elongate crystals are aligned parallel to sub-parallel

Inequigranular textures

- **porphyritic**: see above
- **vitrophyric**: phenocrysts with glassy groundmass
- **glomeroporphyritic**: phenocrysts are in clusters
- **poikilitic**: phenocrysts (**oikocrysts**) enclose other minerals (the **chadacrysts**)
- **sieve texture**: poikilitic in which the inclusions are abundant and fairly closely spaced

Crystal Perfection

These describe individual minerals

- **euohedral**: grains bounded by its own perfect to near-perfect crystal growth faces
- **subhedral**: partly bound by its own growth faces, or growth faces only moderately well developed
- **anhedral**: irregular; little or no evidence for its own growth faces

Grain shapes

- **equant**: approximately equal dimensions; neither elongate nor tabular
- **tabular**: plate-like (one shorter dimension)
- **elongate**: rod-like (one longer dimension)
- **bladed**: three different dimensions; **laths** are bladed

Reaction / intergrowth textures

These terms refer to the texture itself, not the rock or the mineral grains.

- **graphic**: an intergrowth of quartz and K-feldspar in which the quartz forms a crystallographically-controlled network; in 2-D, the quartz shapes resemble cuneiform writing (hence the name)
- **micrographic** = **granophyric**: graphic but only visible in microscope
- **symplectitic**: an intimate often vermicular (wormy) intergrowth of two minerals on the microscopic scale
- **myrmekitic**: a symplectite of quartz in plagioclase (often oligoclase); typically forms at the contact of K-feldspar and plagioclase
- **perthitic**: sodic plagioclase lamellae within K-feldspar resulting from exsolution during cooling
- **coronal**: a concentric ring of one mineral around another
- **kelyphitic**: a coronal texture in which one or more of the outer rings consists of elongate/fibrous radial crystals
- **rapakivi**: corona with plagioclase surrounding K-feldspar
- **cumulus**: euohedral, loosely packed minerals surrounded by other (**intercumulus** or **interstitial**) material
- **adcumulus**: cumulus texture in which cumulate minerals display additional growth after settling out

Extrusive rock textures

- **vesicular**: contains round hollow cavities (gas bubbles)
- **dikytaxitic**: crystals project into numerous irregular vesicles from the surrounding rock
- **pyroclastic**: composed of fragments (possibly microscopic)
- **tuffaceous**: pyroclastic but dominated by ash
- **pilotaxitic**: a felted intergrowth of tiny elongate crystals, typically sub-parallel
- **trachytic**: pilotaxitic, but more strongly parallel crystals
- **welded**: tuffaceous but compacted to remove or partially remove voids
- **eutaxitic**: highly welded to form laminations

Structure terms

- **amygdale**: round cavities filled with late minerals, esp. quartz, calcite, zeolites (adj: amygdaloidal)
- **spherulite**: radial aggregate of acicular / fibrous minerals (adj: spherulitic)
- **perlitic**: closely spaced concentric cracks in glassy rocks
- **scoriaceous**: highly vesicular dark-colored aphanitic, holohyaline, or porphyritic
- **pumiceous**: scoriaceous, but light-colored.
- **lapillus**: pyroclast 2-64 mm diameter (pl.: lapilli)
- **bomb**: pyroclast > 64 mm diameter
- **autolith**: rock fragment from earlier-crystallized region of same/similar melt
- **xenolith**: foreign rock fragment (not from same melt)
- **layered**: containing planar variations in composition or grain size
- **flow banding**: wavy layering in glassy volcanic rocks, typically associated with variable devitrification or vesicularity