

Textures of volcanic rocks

PORPHYRITIC TEXTURE: inequigranular texture of phenocrysts set in a fine grained groundmass.

- Records two stages of crystallisation
- Or may result from a single stage of crystallisation
- **Glomeroporphyritic texture:** phenocrysts of same mineral clustered together
- **Cumulophyric texture:** phenocrysts of different minerals clustered together
- **Vitrophyric texture:** phenocrysts set in a glassy groundmass

POIKILITIC TEXTURE: inequigranular texture where phenocrysts contain numerous inclusions of other minerals.

Host crystal is called an **oikocryst**.

- Inclusion minerals crystallise first while being surrounded by residual melt, high nucleation rate, low growth rate, high melting temperature
- Oikocryst crystallises first with interstitial melt pockets, which crystallise later

Sieve texture: oikocryst densely charged with inclusions

TRACHYTIC TEXTURE: parallel or sub-parallel alignment of fine plagioclase laths or microlites. DIRECTIVE TEXTURE

PILOTAXITIC TEXTURE: random or non-aligned microlites in a felty mass. Seen in basalt. DIRECTIVE TEXTURE

OPHITIC TEXTURE: large pyroxene grain completely encloses small plagioclase laths. Result of **eutectic crystallisation**.

SUBOPHITIC TEXTURE: large pyroxene grain partially encloses plagioclase laths. Result of **eutectic crystallisation**.

INTERGRANULAR TEXTURE: plagioclase laths touch at corners to form a **mesostasis** and this is filled with pyroxene, olivine.

INTERSERTAL TEXTURE: plagioclase mesostasis is filled with glass and its alteration products.

HYALOPHITIC TEXTURE: plentiful glass, microlites and microphenocrysts appear to be floating in glass. HYALOPILITIC TEXTURE: glass fraction becomes dominant and crystals occur as tiny microlites

DIKTYTAXITIC TEXTURE: in **basalt**, abundant angular interstitial gas cavities between plagioclase laths

SPINIFEX TEXTURE: **quench texture**; rapid crystallisation of highly magnesian liquid. Dendritic growth of olivine or pyroxene crystals in a groundmass of devitrified glass. Characteristic of **komatiites**.

SPHERULITIC TEXTURE: radial intergrowth of quartz, feldspar from a line or a point. Common in devitrified felsic volcanics like **rhyolite, dacite**. Results from rapid cooling or extreme undercooling at high temperature.


AXIOLITIC TEXTURE: similar to spherulitic, fibres occurring in a layer and oriented normal to its walls.

VARIOLITIC TEXTURE: radiating plagioclase or pyroxene grains in mafic volcanics such as **basalt, komatiite, tachylite**. They form due to rapid cooling.

Textures of plutonic rocks

CUMULATE TEXTURE: non-interlocking texture in plutonic rocks, called cumulates. Formed due to gravity settling.

- ADCUMULATE TEXTURE: **overgrowths** on early formed crystals, they grow, no late stage minerals, unzoned crystals
- HETERADCUMULATE TEXTURE: presence of **overgrowths** on unzoned cumulus crystals and other poorly nucleated minerals
- ORTHOCUMULATE TEXTURE: **compositional zoning** of cumulus crystals, late stage minerals form in interstices
- MESOCUMULATE TEXTURE: overgrowths on compositionally zoned cumulus crystals along with interstitial minerals. Most common type of cumulate texture.
- CRESCUMULATE TEXTURE: cumulus crystals grow normal to the layering in which they occur. They grow during a period of quiescence.

PERTHITIC TEXTURE: forms due to subsolidus cooling. Slow cooling. Albite lamellae in k-spar 

ANTIPERTHITIC TEXTURE: K-spar lamellae in albite host. Less common.

SYMPLECTITE TEXTURE: any replacement texture.

- MYRMEKITE TEXTURE: intergrowth of quartz and plagioclase. Occurs in acid plutonic rocks such as **granite, granodiorite**.
- GRANOPHYRIC TEXTURE: intergrowth between quartz and alkali feldspar. Forms by rapid **eutectic crystallisation** due to sudden loss of water.
- GRAPHIC TEXTURE: coarser variation of granophyric texture

RAPAKIVI TEXTURE: overgrowth of plagioclase on alkali feldspar

Epitaxis is the general term used to describe the preferred nucleation of one mineral on another preexisting mineral

SECONDARY POST MAGMATIC TEXTURES

URALITIZATION: pyroxene + $H_2O \rightarrow$ amphibole

BIOTITIZATION: pyroxene/ more commonly hornblende + $H_2O \rightarrow$ biotite.
Epidote also formed as Ca is released during hbl \rightarrow bt

CHLORITIZATION: pyroxene/biotite/hornblende + $H_2O \rightarrow$ chlorite. At low temperatures.

SERICITIZATION: feldspar/feldspathoid + $H_2O \rightarrow$ sericite
(fine grained white mica). .

SAUSSURITIZATION: plagioclase \rightarrow epidote . Ca-rich plagioclase is less stable at low temperatures, converts to albite, releases Ca and Al to form epidote.