GY303 Igneous & Metamorphic Petrology

Volcanics Lab

Volcanic Texture

- Rapid Cooling
  - Aphanitic texture
  - Glassy components (glass, pumice, tuff, ash)
- Pyroclastic Eruptions
  - Characteristics of a debris flow
  - Welded tuff

Classification

- Decide between Aphanitic versus Pyroclastic
  - Pyroclastic
    - Ash, Volcanic Glass, Tuff, Welded Tuff, Volcanic Breccia
  - Aphanitic
    - Hand Samples: use color index
      - Light Color or Red = Felsic = Rhyolite
      - Dark Gray or Green = Intermediate = Andesite
      - Black = mafic = Basalt
      - Komatiites are so rare we don't worry about them!
    - Porphyritic textures
      - Phenocryst assemblage will override color index
      - i.e. a green aphanitic groundmass with K-Feldspar phenocrysts would be classified as a rhyolite rather than an andesite because K-Feldspar is more associated with Felsic composition.
      - Don't classify a volcanic as porphyritic unless the phenocrysts make up at least 10% by volume of the rock
      - > 50% phenocrysts by volume = porphyry

Classification continued…

- Phenocryst associations:
  - Felsic: K-Feld, Na-Plag, Ms, Qtz
  - Intermediate: (Na,Ca)-Plag, Hbl, Bi, Cpx
  - Mafic: Ol, Opx, Cpx, Ca-Plag
  - Ultramafic (Komatiites): Ol (Spinifex), Opx, Spinel
- Naming convention
  - Color + texture + accessories + root name
  - Texture: with aphanitic texture you can't use coarse-, medium-, or fine-grained.
  - Accessories: determined by phenocryst or microscope point-count estimates

Classification continued…

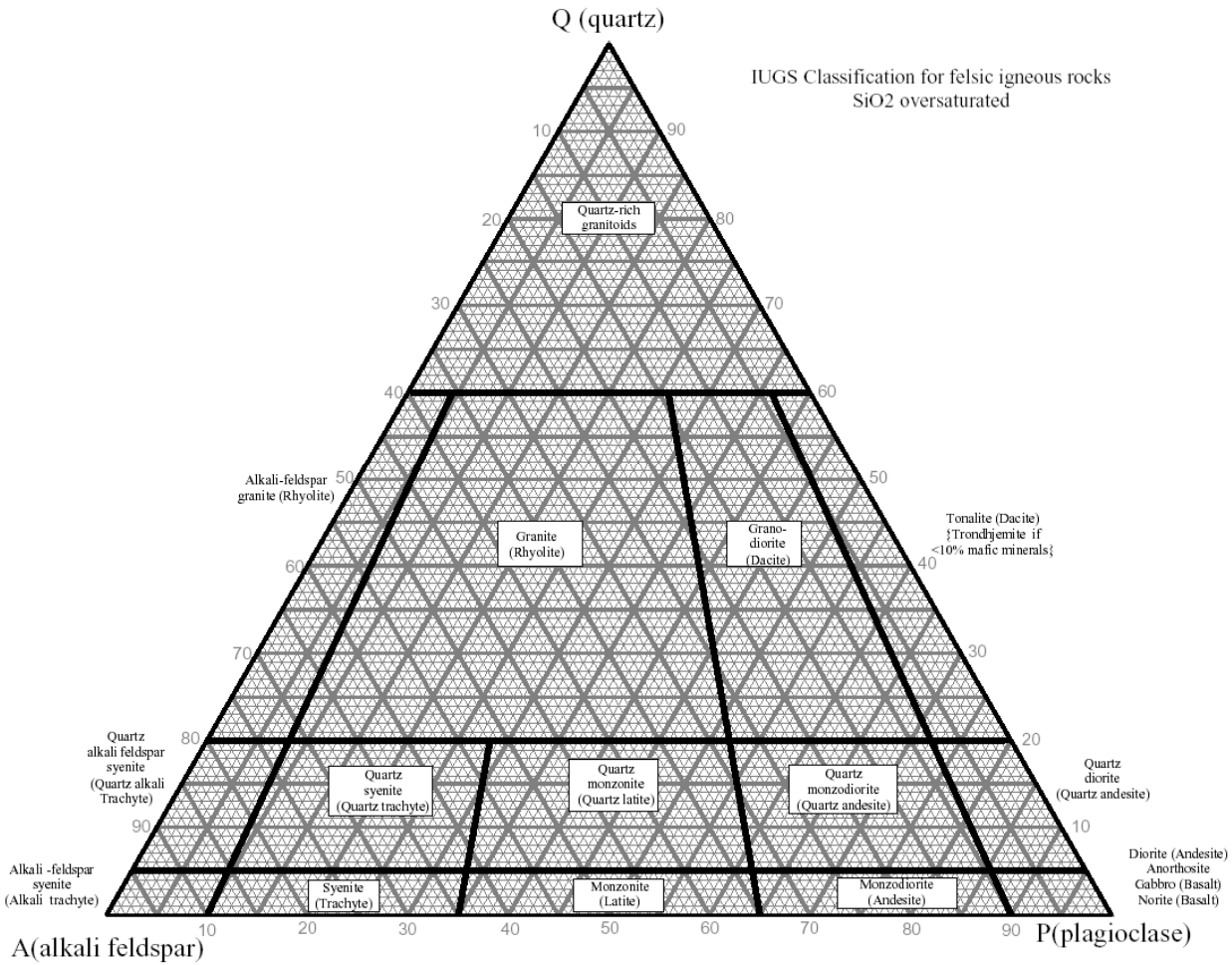
- Chemical Analysis will override color index for aphanitic rocks.
- i.e. a black aphanitic rock with 58% SiO2 would be an andesite, not a basalt.

%SiO_2	Designation
>66%	Felsic
66-52%	Intermediate
52-45%	Mafic
<45%	Ultramafic

IUGS Volcanic Classification

- Used if the aphanitic ground mass can be identified with a microscope.
- Use the root name in parentheses for aphanitic textures.
- Examples:
  - Granodiorite (phaneritic) = Dacite (aphanitic)
  - Monzodiorite (phaneritic) = Andesite (aphanitic)
  - Syenite (phaneritic) = Trachyte (aphanitic)

IUGS Q-A-P Felsic Ternary



Volcanic Lab Test

- 10-15 hand samples
- 2 minutes to identify each sample
- A 5-minute period at end of test to re-visit any sample
- On the test I may indicate a SiO_2 weight % override for a specific test hand sample
- You may be tested on igneous mineral formulas
- Bring your hand lens
- Test should take about 45 minutes
- The extrusive igneous sample drawers contain good samples to study by- the sample key is a accurate for the samples.