

## Potassium Feldspars $\text{KAlSi}_3\text{O}_8$

There are four varieties of K-feldspar (three of which we must be able to identify in this lab using the optical and physical properties of each): Microcline, Orthoclase, Sanidine, and Adularia. Microcline is optically triclinic and is characterized by a distinctive crosshatched twin pattern, often referred to as tartan twinning (see fig 15-18). Orthoclase is optically monoclinic K-spar with a  $2V$  greater than  $40^\circ$ . Sanidine is also optically monoclinic but has a much lower  $2V$  ( $0-40^\circ$ ). Adularia is a low-temperature hydrothermally produced mineral and will not be seen in this lab.

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For more information, see the lecture notes section.

### Feldspar textures:

A variety of intergrowth and exsolution textures can develop in the feldspars, some of which you will learn to recognize in this lab. At high temperatures the alkali feldspars show continuous solid solution between  $\text{NaAlSi}_3\text{O}_8$  and  $\text{KAlSi}_3\text{O}_8$ . At lower temperatures, solid solution is limited to minor substitution near each end member. As a result, when alkali feldspars cool the intermediate members of the solid solution series are thermodynamically more stable as nearly pure sodic and potassic end-member phases. Solid-state exsolution of one feldspar by another will occur along crystallographic planes and ranges in scale from submicroscopic to macroscopic. **Perthite** consists of lamellae of albite in an orthoclase or microcline host, while **Antiperthite** is lamellae of K-spar in an albite host (see fig 15-15, top). When quartz is involved the relationships are more complicated and not well understood.

**Myrmekite** is a quartz-plagioclase intergrowth relatively common in acid and intermediate rocks (fig 15-15 middle). Quartz is commonly found as stringers or vermicules of random orientation within a host plagioclase crystal. Myrmekitic texture is most common along boundaries between plagioclase and orthoclase or microcline grains. **Granophyre** is a textural term

referring to an intergrowth of alkali feldspar and quartz (fig 15-15 bottom). It may be wormy or vermicular, or may occur in regular geometric patterns. *Granophyric texture is an example of a eutectic texture, resulting from the simultaneous precipitation of quartz and feldspar from a melt.*

**Identification:**

Microcline: Hand Sample: Cannot be reliably distinguished from orthoclase or sanidine in hand sample. However, the presence of visible exsolution lamellae is almost always indicative of microcline.

Thin section: Plane Light: Low negative relief.

Colorless but may appear dusty or cloudy. Crossed

Polars: Biaxial (-), 2V 65-88°. Crosshatch or tartan twinning is common and diagnostic. Birefringance is low, producing first order greys.

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Sanidine: Hand Sample: Cannot be distinguished from other K-spars in hand sample. Thin Section: Plane Light: Low negative relief. Colorless but may be cloudy. Crossed polars: Biaxial (-), 2V 0-40°. First order grey interference colors. Sanidine will resemble quartz but is biaxial.

Orthoclase: Hand Sample: Cannot be distinguished from other K-spars in hand sample. Thin Section: Plane Light: Low negative relief. Colorless but may be cloudy. Crossed Polars: Biaxial (-), 2V is greater than 40°.

**One other K-spar to watch out for:**

Anorthoclase: Resembles microcline in thin section, but the tartan twinning is much finer and the 2V is smaller.

Anorthoclase only occurs in Na-rich felsic volcanics and hypabbysal intrusives.