

Olivine Group

Solid solution between Forsterite \leftrightarrow Fayalite
 Mg_2SiO_4 Fe_2SiO_4

Olivine is very common as a primary crystallization product in Fe- and Mg-rich magmas. Pure forsterite is usually only found in metamorphosed dolomites. Intermediate Fe-Mg composition olivine is found in gabbro, basalt, peridotite, pyroxenite, and is the main component of dunite. Fe-rich olivine is found in syenites, phonolites, trachytes, andesites, and dacites. Olivine readily alters to serpentine minerals and will sometimes develop coronas of pyroxene and amphibole.

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For more information, see the lecture notes section.

In metamorphic and igneous rocks olivine occurs as subequant or anhedral grains or aggregates of grains. Euhedral crystals of olivine are common in volcanic rocks. Elongate crystals display parallel extinction and, depending on the thin section cut, will be length fast or length slow.

Identification in thin section:

Plane light: colorless to pale yellow (darker color corresponds to higher Fe contents); Fayalite pleochroism: pale yellow to orangish, yellow or reddish brown. High positive relief.

Cross polars: Biaxial (+) or (-). High birefringence – up to third order colors. (**very diagnostic**). Olivine will also display a distinctive fracturing and no cleavage.

Identification in hand sample:

Olivine grains are usually anhedral and are invariably yellow-green to olive-green in color. They have a vitreous or glassy luster and display conchoidal fracture. (You may have to use a hand lens to observe this). See hand samples for example.