

ACF DIAGRAM

One of the first uses of ACF diagram was by Eskola (1915) in his study of metamorphic rocks. It is used to graphically represent various mineral assemblages (or part of these) that occur in rocks of various composition and within a limited range of metamorphic conditions.

There are 13 major elements (expressed as oxides) in most (not all) metamorphic rocks- SiO₂, Al₂O₃, TiO₂, FeO, Fe₂O₃, MnO, CaO, MgO, K₂O, Na₂O, P₂O₅, H₂O, and CO₂. Besides SiO₂, the five most abundant oxides found in metamorphic rocks are Al₂O₃, CaO, FeO, MgO, and K₂O. The other components either form small proportions of minor minerals (TiO, P₂O₅, Fe₂O₃) or are considered to be mobile components open to the system (H₂O, CO₂).

The three components plotted on ACF diagrams are particularly useful for showing assemblage variations in metamorphosed, basic, igneous rocks and impure limestones (marls).

Nominally, the ACF diagram plots the following components:

$$A = \text{Al}_2\text{O}_3$$

$$C = \text{CaO}$$

$$F = \text{FeO} + \text{MgO}$$

However, each of these components has to be modified slightly to account for the presence of other, minor components in the rock.

Such modification leads to:

$$A = [\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3] - [\text{Na}_2\text{O} + \text{K}_2\text{O}]$$

$$C = [\text{CaO}] - 3.33[\text{P}_2\text{O}_5]$$

$$F = [\text{FeO} + \text{MgO} + \text{MnO}]$$

The minerals quartz and albite are assumed to be present in the rocks and are not shown on the diagram.

When these calculations are done for a wide variety of rock compositions and grouped as pelitic, quartzo-feldspathic, basic, and calcareous (the fields are as shown in figure-1).

Most shales will plot in the field of Pelitic Rocks. Quartzo-feldspathic rocks like feldspathic sandstones, granites, and rhyolites will plot in the Quartzo-Feldspathic field. Basic igneous rocks, like basalts and gabbros will plot in the field of Basic Rocks, and siliceous limestones and dolomites will plot in the field of Calcareous Rocks.

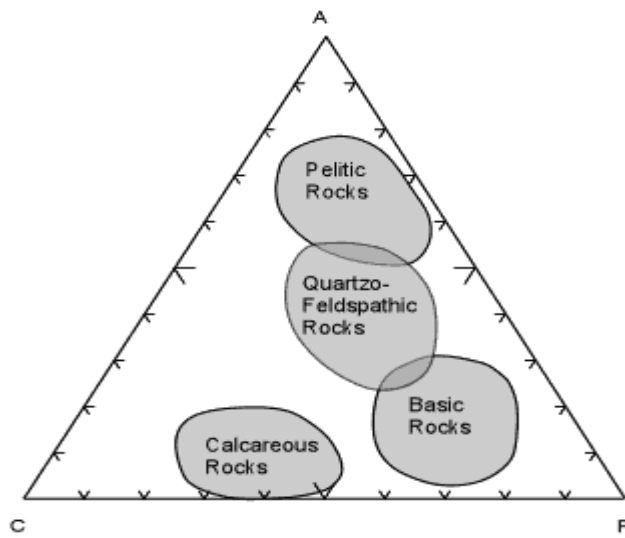


Figure-1

Figure-2- The diagram below shows the plotting positions of some of the more common minerals that occur in metamorphic rocks.

