

Chemical removal of feldspars and layer silicates from quartz-bearing rocks for X-ray petrofabric studies

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Abstract

In X-ray petrofabric studies of quartz textures, the presence of feldspars and layer silicates gives rise to interferences. These minerals may be selectively digested in hydrofluosilicic acid in order to isolate the quartz.

In the investigation of quartz textures in rocks there are many instances when it would be desirable to isolate the quartz. For instance, in X-ray diffraction studies of the crystallographic orientation of quartz, the presence of feldspars and, to a lesser extent, layer-silicate minerals makes the isolation of specific quartz reflections difficult. This interference is troublesome with texture goniometers, and is also a complicating factor in studies using X-ray diffraction cameras.

The most satisfactory resolution of this problem appears to be chemical removal of the feldspar and layer-silicate minerals by means of hydrofluosilicic acid, H_2SiF_6 . For texture studies based on the X-ray diffraction camera technique, a standard petrographic thin section is first prepared (Starkey, 1964). The section is then removed from the glass slide and transferred onto 3M Scotch tape, which is transparent to X-rays. The rock slice on the Scotch tape backing is immersed in 5 ml 30 percent H_2SiF_6 at 15° to 20°C for 3 days. The time for complete digestion of feldspar and layer-silicate minerals is variable, depending on grain size and other factors; a second 3-day digestion may be necessary in some instances.

Upon removal from the acid bath the section is washed in deionized water and allowed to dry. Chemical isolation of quartz in powders containing feldspar and layer silicates by H_2SiF_6 has been described by Syers *et al.* (1968).

Scotch tape and its adhesive are not adversely affected by H_2SiF_6 , and the specimen mounted on the tape can therefore be used directly in the X-ray diffraction cameras. No digestion of quartz by H_2SiF_6 has been observed.

Chemical etching of feldspar and layer silicates may also be conducted on small rock chips for quartz grain-shape studies, either by optical measurement or scanning electron microscopy.

References

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