

# Application of Fourier Transform Infra-Red Spectroscopy (FTIR) for Pegmatite Mineral Quantification

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## ABSTRACT

Fourier transform infra-red spectroscopy is a technique which is used to obtain an infra-red spectrum of absorption or emission of solids, liquids or gases.

The absorption excites molecular vibrations and rotations, which have frequencies that are the same as those within the infra-red part of the spectrum. The frequency of the response relates to specific bonds and the greater the response the higher the concentration. It is therefore possible in a similar way to how X-ray diffraction (XRD) works to both identify and quantify a wide range of compounds.

Minerals contain a wide variety of bonds and the more open their structure the better the infra-red response. This means that minerals which contain covalent bonds such as clay minerals can be both identified and quantified with considerable accuracy. Further to this the development of new detectors and sampling plates based on attenuated total reflection (ATR) technology means that samples can be presented to the instrument without the need for complex preparation, they simply need to be dry and ground to less than 75 microns.

Instrument run time is typically two minutes and SGS has set up fully quantified methods for clay minerals including clay minerals, micas including muscovite and petalite, feldspars, quartz, spodumene and apatite. The quantification ranges vary between minerals but is usually between 5-100% with error generally less than 15% i.e.  $R^2$  greater than 90 even for clay minerals.