

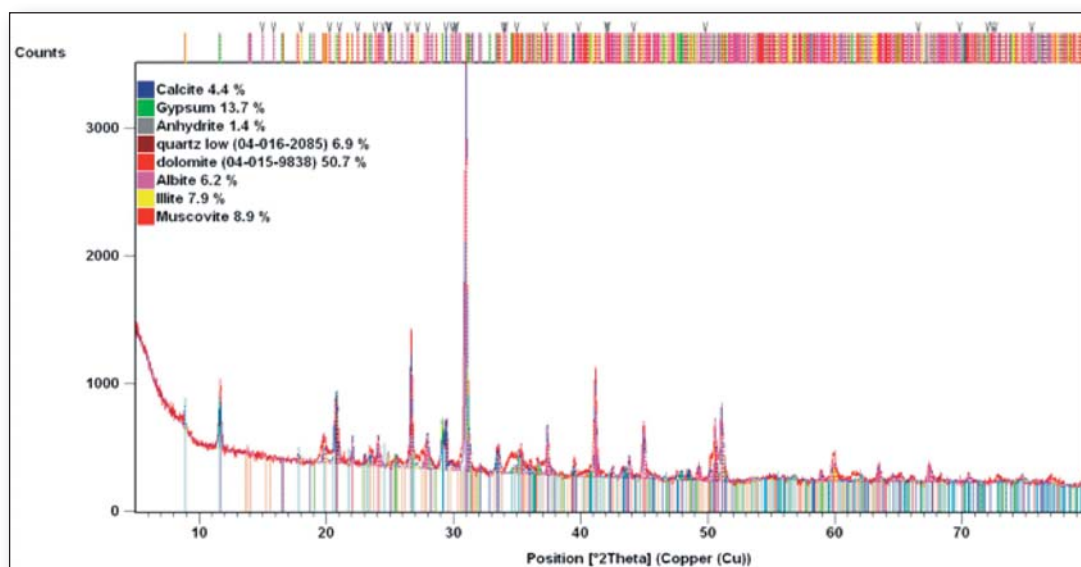
## X-Ray Powder Diffraction: A Rapid Mineralogy Analytical Technique

X-ray diffraction (XRD) is a well-established analytical technique, used in the mining and exploration, materials testing, life sciences, pharmaceutical, and other industries, for the identification and/or quantification of crystalline phases. This rapid and powerful technique requires minimal sample preparation, and can be used independently or in corroboration with geochemistry and/or automated mineralogy by MLA or QEMSCAN. At Actlabs, the Panalytical X'pert Pro diffractometer, equipped with a Cu X-ray source and an X'Celerator detector, along with the X'Pert HighScore Plus software suite, allows us to offer the following services:

### Services

#### Mineral Identification

- **Qualitative:** The crystalline mineral phases are identified.
- **Semi-Quantitative:** The crystalline mineral phases are identified and quantified. Quantification is based on the Rietveld method, which uses crystal structure information to calculate the full diffraction pattern.
- **Quantitative:** In addition to identifying and quantifying crystalline minerals, corundum is added as an internal standard, and used to quantify the amount of X-ray amorphous material in the samples.



#### Clay Speciation

In addition to quantitative mineral identification on the bulk sample, the less than 2  $\mu\text{m}$  fraction is separated from the bulk sample and further analyzed. Random and preferentially oriented slides, ethylene glycol saturation, and heating are used to identify the clay species present in the sample.

#### Cluster Analysis

Statistical tests are used to group large volumes of samples into clusters based on the similarity of their diffraction patterns. Further analysis of representative samples and of outliers from each cluster could be used to determine: the mineral composition at different positions within an alteration system; potential differences for mineral processing; and much more. Please contact us to further discuss the scope of this analysis for your project.