X-Ray Diffraction and Optical Microscopy at GTK Mintec

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X-Ray Diffraction (XRD) is used for:

- Identification of mineral phases
- Quantitative mineralogical analysis with the Rietveld Method
- Fast characterization of mineral processing samples

Quantitative XRD Analysis with the Rietveld Method

A) Analysis of the sample: A peak profile is generated by the diffractometer.

B) The peak profile is compared to a mineral database and the mineral phases are identified.

C) A Rietveld profile is generated and fine-tuned to match the original sample profile.

D) Final quantitative analysis is ready.

Plusses: +++
- Fast (ca. 7 minutes/sample)
- Sample preparation is simple, easy and fast
- Automated sample loading or up to 64 samples at a time
- Continuous samples feeding while the instrument is running
- Applicable also with very small sample mass (<<1g)
- Rietveld quantification of a large number of similar samples is very cost effective

Minuses: - - -
- Detection limit is rather high, 0.3 – 0.5 %
- Quantitative results may not be accurate for small concentrations (<2%)

Optical microscopy:
An important research method still today
• Identification of minerals
• Classification of rocks
• Description of textures

Digital photomicrographing An essential part of reporting