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# Studies of phase changes and reactions of some sulphide minerals using in-situ high temperature X-ray diffraction

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Minerals generally undergo structural changes and chemical reactions during heating. Some of the phase changes and reaction products are quasi-stable. Analysis of quenched sample would not reveal these changes, as the phase changes may be reversed or altered during cooling. In-situ high temperature X-ray diffraction (HTXRD) provides a way of detecting such changes. Selected sulphide mineral samples were analysed in in-situ HTXRD for the temperatures up to 900 °C to study the possible intermediate phases that would otherwise disappear in quenched samples. In-situ X-ray diffraction patterns were collected at every 100°C interval. Special attention was focussed on the reactions of pyrite, which is converted to magnetite in an oxidative environment through several intermediate phases. Pyrrhotite and hematite are the most common intermediate phases. However, the amount of each intermediate phase is determined mainly by the heating environment. It was noted that more often than not, these intermediate phases are non-stoichiometric. In-situ high-temperature diffraction patterns of other minerals are also discussed here with possible reactions that occur during heating.