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# Quantitative Analysis of Naturally Occurring Multicomponent Mineral Systems by X-ray Diffraction

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**Abstract:** A theory for the quantitative analysis of multicomponent mineral systems by means of X-ray diffraction is presented. A linear interaction between mineral pairs is postulated. The theory is verified experimentally for bicomponent and tricomponent systems using a variety of sample preparation techniques including random powder mounts, suspensions sedimented onto glass slides, and pressed powder pellets. The minerals studied include quartz, fluorite, kaolinite, glauconite, illite, and montmorillonite.

The determination of the linear interaction factors for mineral pairs is treated theoretically and experimentally. Emphasis is placed upon techniques that are applicable to naturally occurring mineral systems. Four approaches are presented for determining linear interaction coefficients for various types of such mineral systems. These approaches are applied to the experimental data and the results are compared. Results accurate within 2 per cent are commonly obtained.

Experimental techniques are discussed and a qualitative and quantitative error analysis is presented. It is shown that the indicated quantities present may not be particularly sensitive to the value of the linear interaction coefficient.

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