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# Treatment of Microanalyses of Intimately Mixed Products of Mica Weathering

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**Abstract:** Weathering of minerals often produces intimate mixtures of reactants and products in a smaller volume than that explored by an electron microprobe. As a result, many microanalyses are difficult to decipher because they are composite analyses of mixtures. A procedure to resolve such microanalyses into their component parts was applied here to data obtained in a study of the weathering of muscovite and biotite in granite gneiss and associated soils. A key element oxide content ( $K_2O$ , in the examples demonstrated) was plotted against Si/Al ratio for all data. This achieved a spread of points having an external shape depending on the compositions of the pure phases present in the various mixtures analyzed. In all probability, some of the microanalyses consisted of only a single phase, or almost so, and these points were located at or near extremities of the body of data. The aim of subsequent treatment was to encompass the data within boundary curves, each of which corresponded to mixtures of any two of the pure phases present. The chemical compositions of some phases, for example, kaolinite and muscovite, are known, and boundary curves for such mixtures were calculated directly. The compositions of unknown or suspected phases, however, were estimated from the graph of  $K_2O$  content against Si/Al ratio, in conjunction with graphs of the other element oxide contents plotted against Si/Al ratio. The unknown compositions were subsequently refined by successive approximations. Data in the vicinity of the boundary curves were adjusted for the presence of free iron oxides containing structural Al. Once a satisfactory set of intersecting boundary curves was developed to encompass the data, the compositions of the major phases in each system were obtained, and the diagram of boundary curves was used to estimate the relative proportions of these phases at each point analyzed by the microprobe.

**Key Words:** Chemical composition • Electron microprobe • Mica • Statistical treatment • Weathering

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