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Is extraction of Fe from iron based minerals an appropriate method for determining trace elements?

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Various trace elements in different types of iron based geological reference materials [JSS 804-1 (hematite), JSS 820-2 (limonite), SU-1 and SU-1a (iron-nickel-copper-cobalt ores)] were investigated using k₀-NAA in both forms: instrumental (k₀-INAA) and radioanalytical (k₀-RNAA).

To avoid the interference of iron as a matrix element, firstly mineral was dissolved in aqua regia then liquid-liquid extraction procedure by diisopropyl ether (DIPE) in hydrochloric acid media was applied. Trace elements were determined using k₀-INAA after irradiation of water phase. Secondly, the mineral was irradiated and than radiochemical extraction of Fe were done using DIPE and trace elements were determined by k₀-RNAA in water phase.

The k₀-NAA method, applied to determine the content of the investigated elements, after removal of Fe enabled to follow the distribution of 39 elements through their corresponding intermediate/medium and long half-lived radionuclides. The elimination of the matrix element lowered the detection limit for some trace elements compared to their corresponding values determined by k₀-INAA in powder form and with certified values for some elements. However, the results for some elements (e.g. As, Ba, Ca, Cs, Hf, K, Na, Zn and Zr) are higher comparing to k₀-INAA in powder due to the adsorption/desorption on glassware. The k₀-RNAA procedure shows better agreement than k₀-INAA with data obtained by k₀-INAA in powder mostly due to negligible blank contribution. The results of this work will be presented and discussed.

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