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Mineralogical, geochemical and isotopic investigation of the Akdag (Divrigi-Sivas) iron deposit, Turkey

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The Akdag iron deposit in the vicinity of Divrigi region, Turkey, was formed concordantly to the bedding within the Bozbel Formation which is composed of sandstone with ore pebbles and Nummulitic limestone-marl alternation. As a result of post-depositional processes, the mineralization was tectonically emplaced within the host rocks. Based on fossil assemblage, the deposit is of Cuisian age. In the Akdag iron deposit, magnetite is the primary ore mineral which partly shows sign of transportation and has been martitized along the relicts. The secondary ore minerals are hematite and goethite. Hematite is transformed from magnetite but it may also occur replacing the sedimentary grains revealed by typical ringförmig and colloidal structures. Goethites that are formed by alteration of hematite in a later stage fill the space between magnetite grains. In the studied iron deposit, Eu/Eu*, (La/Yb)n and Ce/Ce* ratios are 1.63 (average), 1 and 0.75-1.06, respectively. The average HREE and LREE values are 0.15 and 1.25. La/Ce and Y/Ho ratios are 0.5-1 and 10-36. The comparable element enrichment patterns of the studied ore samples and the Divrigi hematite and magnetite deposits might indicate that both types of mineralizations are of similar source. REE's of ore samples are found to be enriched 10- to 100-fold with respect to PAAS and NASC. In comparison with chondrite, LREE's are enriched 1 to 50-fold whilst HREE's remained unchanged. According to stable isotope studies conducted on calcite and dolomite samples of the carbonate host rocks, δ13C values (VPDB) are -5.91 to +3.52 permil for calcites and -1.01 to +5.68 permil for dolomites and δ18O values (VSMOW) are +21.94 to +27.27 permil for calcites and +25.39 to +29.55 permil for dolomites. All these findings yield that the Akdag iron mineralization is of a chemical sedimentary type and was deposited in a shallow marine environment (hdyrogenetic).