

Geochemical constraints on the genesis of apatite ores from Mesozoic alkaline intrusive complexes, Central High-Atlas (Morocco)

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The major apatite ores from the Central High-Atlas Mesozoic alkaline intrusive complexes (Morocco) have been investigated through integrated field, petrographic, and geochemical studies (Ouabid et al., 2021). The apatite deposits occur as veins—few mm to several cm thick—, spatially associated with syenite bodies. Gem-quality crystals of apatite—up to 15 cm in size (e.g., Ouabid and Raji, 2023)—, are associated with albite, clinopyroxene (hedenbergite–augite–diopside), amphibole (hornblende–edenite–actinolite), K-feldspar, quartz, magnetite, titanite, epidote, prehnite, and calcite. Two types of apatite have been distinguished according to their halogen contents including F- and Cl-apatites. Both types are enriched in rare earth elements (0.5-2 wt.% Σ REE) and have major–trace element contents consistent with a magmatic origin, corroborated by the chemical similarity with accessory apatite in the host alkaline intrusions, as well as with other reference igneous apatites. Though, hydrothermal fluids percolating through country sedimentary rocks were also implicated, as revealed by the striking Na enrichment observed in the Cl-rich apatites, likely inherited from Triassic evaporites, showing close spatial relationships with the alkaline intrusions.

References:

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