

The Chromitites of the Collo Ultramafic Rocks (NE Algeria): Two Generations Evidenced From Petrological, Mineralogical and Isotopic Studies

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Abstract : The ultramafic rocks of the Collo region crop out as « stratified » masses that cross-cut older metamorphic formation of the basement. These rocks are mainly peridotites and serpentinites. The peridotites are composed of olivine, orthopyroxene, clinopyroxene and spinel (chromite). The chemical composition of these lherzolites show a magnesian character with high MgO contents (34.4 to 37.5%), high Cr (0.14 to 0.27%), Ni (0.14 to 0.26%) and Co (34 to 133 ppm) and low CaO and Al₂O₃ (0.02 to 2.2 and 0.5 to 2.8 % respectively). They represent a residue (restite) of a mantle magmas partial melting. The chromite which represents about 2 to 3% of the rock is a ubiquitous mineral and shows two different generations: primary idiomorphic millimetric crystals and secondary very fine, xenomorphic and interstitial aggregates. The primary chromites are aluminiferous crystals. They show high Al₂O₃ (25.77% to 27.36%) and MgO (10.70% to 13.36%). Cr# (100*Cr/(Al+Cr)) varies between 45 and 48, and Mg# (100*Mg/(Mg+Fe²⁺)) varies between 49 and 59. On the other hand, the secondary interstitial grains are iron-rich chromites; they show low Al₂O₃ (4.67% to 9.54%) and MgO (4.60% to 4.65%). Cr# is relatively high (77 to 88) whereas Mg# show relatively low values, varying between 22 and 25. Oxygen isotopic composition of both types of chromites is consistent with their derivation from a mantle source ($\delta^{18}\text{O}$ vary between +3.9 and +5.2‰), though a contribution of ¹⁶O-rich component to the secondary chromites is not ruled out.

Keywords : peridotites, serpentinites, chromite, partial melting, collo, Algeria

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