# Petrological and mineralogical characteristics of pyroxenites, hornblendite and websterite xenoliths from the Jbel Saghro Volcanic Field (eastern Anti-Atlas, Morocco)

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The heterogeneous suite of mantle and crustal xenoliths sampled by the nephelinites from the Saghro area (Anti-Atlas, Morocco) could be divided into three groups: a) spinel-bearing websterites, b) pyroxenites, and c) hornblendites. The websterites (size<3 cm), the pyroxenites and hornblendites (4 cm<size<8 cm) could be observed in a same lava flow. Representative samples from those 3 groups have been selected for a systematic petrological and mineralogical study in order to constrain their origin and history. The petrographic and mineralogical features of the investigated upper mantle and crustal xenoliths evidence that: a) websterites contain olivine (89<Mg#<91), orthopyroxene (90<Mg#<91), clinopyroxene (89<Mg#<89) and spinel (74<Mg#<75) with adcumulate textures; b) pyroxenites contain clinopyroxene (63<Mg#<83), phlogopite (66<Mg#<78), kaersutite (63<Mg#<82), titanomagnetite, pyrochlore and rarely olivine (84<Mg#<87) with adcumulate or orthocumulate textures; c) hornblendites contain hornblende (71<Mg#<74), clinopyroxene (43<Mg#<56), biotite (76<Mg#<77) and rarely titanomagnetite. Temperature estimates for websterites xenoliths using the Brey and Kohler (1990) thermometer applied on orthopyroxene, at a fixed pressure of 15 kbars yield temperature ranging from 900 to 993°C. For pyroxenites and hornblendites, we applied the geobarometer of Schmidt (1992) and deduced pressure equilibration ranging from 9 to 10 kbars for the pyroxenites and from 8-8.5 kbars for the hornblendites. Those PT estimates evidence that the three types of xenoliths were probably sampled at different levels of the lithosphere: websterites (upper mantle), pyroxenites (crust-mantle boundary), hornblendites (crust). The websterites probably represent channels of focused melt percolation within upper mantle lherzolite wall rocks while the pyroxenites and hornblendites are cumulative magmatic rocks with alkaline affinities.

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