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GEHLENITIC XENOLITHS FROM THE KLANÁC HILL, POMÁZ, VISEGRÁD MOUNTAINS, HUNGARY

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The Klanác Hill is situated north-west of Pomáz on the southern part of the Visegrád Mountains. An andesite tuff that belongs to the stratovolcanic sequence of the Miocene Badenian andesitic volcanism (Mátra Andesite Formation) occurs here in several outcrops. The andesite tuff is white due to a considerable argillization.

Xenoliths can be found in a large amount in the andesite tuff, which derive from the broken out rocks of the substratum. A considerable part of the rock inclusions have carbonate origin. These carbonatic protoliths underwent thermal metamorphism, resulting in contact marbles; however, where contact metasomatic processes took also place, Ca-silicate associations formed.

The most frequent minerals of the Ca-silicate xenoliths are: garnet with andradite-grossular composition, diopside, calcite, and the members of the spinel group (mainly magnetite). Gehlenite occurs very rare in these xenoliths, however, it is one of the main components where it occurs.

The gehlenite-bearing xenoliths consist of the following three phases in descending order of quantity: gehlenite, poorly crystallised silica (chalcedony) and garnet with Adr_{77} Grs_{21} Prp_2 composition. The gehlenite has a honey yellow colour, resinous lustre and it forms sub-millimetric, equant crystals, which appear under polarising microscope as colourless, anhedral or subhedral grains. Its composition varies in a very limited range (Gh_{91} $Åk_9$ to Gh_{92} $Åk_8$). The lattice constants of gehlenite calculated from the X-ray powder diffraction pattern are a = 7.706 Å and c = 5.008 Å.

The gehlenite formed from calcite of the protolith and metasomatically introduced silica and alumina as follows:

$$2CaCO_3 + SiO_2 + Al_2O_3 \rightarrow Ca_2Al_2SiO_7 + 2CO_2.$$

It is apparent, that the metasomatizing fluid should have to have a rather low Si/Al ratio to produce gehlenite. It could be formed rarely in SiO_2 saturated magma (andesite). This fact can explain the much larger frequency of garnet xenoliths in the andesite tuff in Klanác Hill, because the garnet (grossular) is formed by a higher Si/Al ratio:

$$3CaCO_3 + 3SiO_2 + Al_2O_3 \rightarrow Ca_3Al_2Si_3O_{12} + 3CO_2.$$

Consequently, whether gehlenite or grossular was formed at this metamorphic stage probably would depend largely upon the local availability of alumina in the metasomatizing fluids.

The chalcedony is not in equilibrium with gehlenite and garnet, because it formed secondarily, perhaps simultaneously with argillization of the andesite tuff. In some places, the chalcedony appears as a pseudomorph after an undefined columnar mineral.