



Kosmin granodiorite and its variable enclaves

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Kośmin granodiorite represents Variscan magmatic activity in Poland, Sudetes. It is ca. 335 Ma and can be correlated with a similar magmatic episode in Czech Republic, Germany and Austria [1]. The geochemical data such as high contents of MgO and K₂O, enrichment in LILE, high ratios of LREE/HREE, enrichment in Cr and Ni and low Na₂O contents are similar to other K-rich intrusions in the Bohemian Massif [1].

Kośmin granodiorite contains variable dioritic, sjenitic and monzodioritic enclaves which potentially record processes of magma generation and differentiation typical for potassic magmatism.

Three analyzed samples of the host granodiorite have similar composition (58 wt. % SiO₂, 5 wt. % MgO, 4 wt. % K₂O, 43 ppm Ni, 470 ppm Sr, 9 La/Lu_N). The mineral composition is dominated by K-feldspar and plagioclase, with subordinate hornblende, biotite, quartz and zircon and apatite as accessory minerals. An in plagioclase varies from 33 to 42% and average SrO content in plagioclase is ca. 650-850 ppm.

The enclaves in the granodiorite can be divided into 3 groups according to their mineralogy and chemical composition:

(1) Monzodiorites are the dominating type and are characterized by a range of chemical compositions (50-55 wt. % SiO₂, 6-10 wt. % MgO, 4-5 wt. % K₂O, 30-200 ppm Ni, 300-450 ppm Sr, 5-11 La/Lu_N). They consist of plagioclase, pyroxene, amphibole, biotite, K-feldspar, quartz and often contain variable amounts of plagioclase phenocrysts. The phenocrysts have variable An contents from 32 to 70%, but the highest An is observed in thin (ca. 100 μm) patchy zones close to the plagioclase rims. The SrO contents in plagioclase are ca. 900 ppm and are sometimes higher in the patchy zones up to 1100 ppm. The structure and chemical composition of phenocrysts is consistent with their crystallization in the host granodioritic magma and later transport and resorption in the monzodioritic magma.

(2) Syenites comprise ca. 10% of enclaves and are characterized by very high K₂O contents up to 9 wt. %, high Ba up to 3500 ppm and positive Eu anomaly ca. 1.6. They are dominated by K-feldspar and biotite with minor amounts of hornblende and plagioclase. An content in plagioclase is low 31 to 41% and SrO content is 670 ppm, lower than that in the monzodioritic plagioclase.

(3) Cumulates represented so far by two enclaves are characterized by high MgO contents (11 wt. %) and low SiO₂ contents (48 wt. %). The major minerals in the cumulates are pyroxene, hornblende, biotite and feldspar. Plagioclase contains 30-43% An and SrO contents are ca. 650 ppm.

Chemical composition of whole-rock samples, composition of individual minerals and microstructures observed in plagioclase are consistent with the enclaves being represented by either co-mingled magmas (monzodiorites) or entrained material (syenites and cumulates, possibly from the source region).

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[1] Wenzel et al., International Journal of Earth Sciences (Geol. Rundsch.) 1997, Vol. 86, No 3, pp. 556-570