Geophysical Research Abstracts
Vol. 17, EGU2015-10635-3, 2015
EGU General Assembly 2015

Petrology and geochemistry of mafic and ultramafic cumulates occurring as xenoliths in volcanic rocks from Polish part of Central European Volcanic Province.

Michał Dajek (1), Magdalena Matusiak-Małek (1), Jacek Puziewicz (1), and Theodoros Ntaflos (2)

(1) University of Wroclaw, Institute of Geological Sciences, Wroclaw, Poland (magdalena.matusiak@ing.uni.wroc.pl), (2) University of Vienna, Department of Lithospheric Research, Althanstrasse 14, Vienna, Austria

Mafic xenoliths coexisting with the peridotitic ones in rocks from Polish part of Cenozoic European Volcanic Province have been scarcely examined. (Bakun-Czubarow and Białowolska, 2003, Mineralogical Society of Poland- Spec. Pap. and references therein; Matusiak, 2006, Min. Polonica- Spec. Pap.; Puziewicz et al., 2011, JoP). In this study we present new results on mafic and ultramafic xenolithic rocks from the Wilcza Góra, Winna Góra, Góra Świątek, Mnisia Górka and Grodziec volcanic rocks in the Złotoryja-Jawor Volcanic Complex.

The studied xenoliths are either plagioclase-free (clinopyroxenite, websterite) or plagioclase-bearing (anorthosite, gabbro, olivine-bearing gabbro and norite). Both the types may occur in the same volcanic rock. The cumulative xenoliths are smaller than peridotitic ones, blackish and show clear cumulative, coarse grained textures. Beside the rock-forming phases, the xenoliths occasionally contain spinel, sulfides and amphibole. Usually clinopyroxene grains occurring in gabbros are strongly corroded or disintegrated, while other phases are well-preserved. Contacts between xenolith and host volcanic rock are usually sharp with subhedral crystals of clinopyroxene growing at the xenolith surface.

The mineral grains are usually zoned and chemical equilibrium between phases is scarce. Clinopyroxene in plagioclase-free rocks has composition of diopside with occasionally elevated Al, Ti and Cr contents. It's mg# varies from 0.89 to 0.79. It is slightly to moderately enriched in LREE; the REE patterns are concave, and the normalized values vary significantly between localities. It shows negative Sr anomaly, depth of Ti anomaly is variable. Orthopyroxene is Al-rich enstatite with mg# varying from 0.85 down to 0.75. Orthopyroxene in websterites is LREE depleted and show strong positive Ti and Zr-Hf anomalies. Opaques are ilmenite - Ti-magnetite solid solution and/or sulfides

Clinopyroxene forming plagioclase-bearing rocks also has composition of diopside, but its mg# is lower than in other rocks (0.68-0.88). It is always LREE enriched and shows negative Eu, Ti and Sr anomalies. Orthopyroxene occurs only in norite from Wilcza Góra. It composition is strongly heterogenous and the mg# vary from 0.60 to 0.75. Fo- and NiO-poor (62-69% and 0.04-0.10 wt.%, respectively) olivine is present in gabbro from Winna Góra. Feldspar is typically plagioclase (An30-60), but in rims the composition grades toward ternary feldspar (Or up to 45%). Plagioclase is LREE enriched and shows strong positive Eu anomaly. It is enriched in Sr and depleted in Zr-Hf. Composition of opaques is similar to that in plagioclase-free rocks.

Modelling based on the trace element composition of clinopyroxene suggest that all the studied xenoliths are precipitates from alkaline silicate magmas, usually similar to the host volcanic-rock. Relatively high content of iron in silicates suggest crystallization at crustal depths or at crust/mantle boundary, but ratios between AIV and AlVI in clinopyroxene suggest that plagioclase¬-bearing rocks crystalized in different conditions than pyroxenites (Aoki and Shiba, 1976). Origin of xenoliths from Złotoryja-Jawor Volcanic Complex is different than that of clinopyroxene-rich mafic rocks from Lutynia basanite (Lądek Zdrój Volcanic Complex (Ackerman et al., 2012; J. of Geosciences).

This study was possible thanks to the project NCN 2011/03/B/ST10/06248 of Polish National Centre for Science.