

PETROGRAPHIC AND GEOCHEMICAL STUDIES ON THE KOMORNÍ HŮRKA SCORIA CONE, CHEB BASIN, CZECH REPUBLIC

J. GOTTMANN, H. TOBSCHALL

Institute of Geology and Mineralogy, Chair of Applied Geology, University of Erlangen-Nürnberg, Schloßgarten 5, 91054 Erlangen, Germany

The scoria cone of Komorní Hůrka is situated in the western part of the Cheb basin between the cities of Cheb and Františkovy Lázně. The Quaternary volcano is composed mainly of tephra dominated by pyro-clastically fragmented ash, as well as lapilli and bombs. The pyroclastic deposits and distinct layers of hydroclastic deposits are fairly well exposed in a formerly quarried area at the south-eastern slope of the scoria cone.

At the south-western slope of the Komorní Hůrka, a 90 m long lava flow with a maximum height of 5.5 m is exposed. The blocky olivine nephelinite lava was probably erupted from a flank fissure and not from the central vent. The lava flow shows internal vertical zoning due to different cooling histories. The average composition of the holocrystalline lower and central parts of the flow is titanogaugite (41 vol. %), nepheline (21 vol. %), olivine (18 vol. %), iron oxides (15 vol. %), phlogopite (3 vol. %) and melilite (2 vol. %). Towards the upper part of the lava flow, a highly altered glassy matrix dominates with an average of 36 vol. %, and an increasing average porosity of 50 vol. %. The lower and central parts of the flow show average porosities of 10 vol. %. The average colour index of the glass-free domains of the lava flow is 79. Ultramafic nodules within the flow represent either clinopyroxene cumulates from the magma or mantle-derived clinopyroxenite xenoliths.

The pyroclastic deposits form agglomerates with fluidally shaped bombs and lapilli. Highly vesicular clasts are present with irregular shape and phenocrysts (predominantly titanogaugite) within a tachylitic glass matrix. Some lapilli and bombs show a thin (< 50µm) highly palagonized sideromelane rim. The agglomerates are well-sorted with an Inman sorting parameter (σ_ϕ) of 1.85 and a median diameter (M_ϕ) of -2.7.

The hydroclastic deposits are dominated by ash- and lapilli-sized particles. The reddish colour of these layers is derived from the high amount of slightly baked wall rocks from the underlying basement (Variscan mica-schists and quartzites). These lithic components occur from sand- to boulder-size. The xenolith-rich ash and lapilli deposits show poor sorting with $\sigma_\phi = 2.45$ in comparison to the well-sorted pyroclastic fall-deposits. The clasts are equant in shape with low vesicularity. Cauliflower bombs as well as bombs with a high abundance of metamorphic wall rocks are part of the hydroclastic deposits. Jigsaw cracks occur in most sideromelane grains which, without exception, are altered to dull yellowish-brown palagonite.

Glass-free volcanic rocks of Komorní Hůrka show average contents of $\text{SiO}_2 = 39.5$ wt. %, $\text{Na}_2\text{O} = 3.3$ wt. % and $\text{K}_2\text{O} = 1.9$ wt. %. Ni (180–221 ppm) and Cr (353–470 ppm) contents together with the high colour index and low differentiation index (26) suggest a primitive magma. The olivine nephelinite is strongly enriched in incompatible trace elements such as Ba, Nb, Sr, Zr but is depleted in Rb and K (Fig. 1). Due to the only minor variation in the LILE-ratios and the absence of negative Nb anomalies throughout the sequences and the lava flow, the enrichment in incompatible elements is unlikely to reflect crustal contamination. Thus a heterogeneous LILE-enriched mantle source may be assumed for the Komorní Hůrka alkaline magmas. Residual phlogopite and/or amphibole in the source may be the cause for the depletion of Rb and K in the olivine nephelinite.

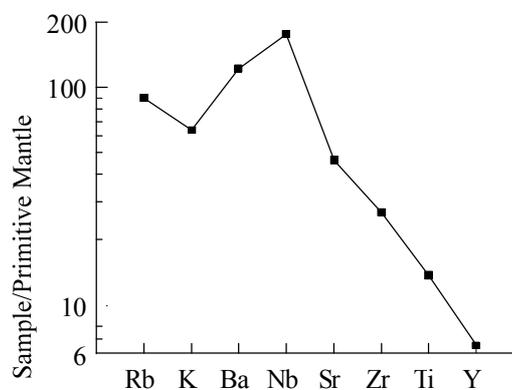


Fig. 1: Average primitive mantle-normalized abundances of trace elements of the glass-free domains of the Komorní Hůrka lava flow.