Fe-Ti Oxides in Selected Volcanic Rocks of the České Středohoří Mts.

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The České středohoří Mts., volcanic hills, situated at the northwestern margin of the Bohemian Massif, were formed simultaneously with the formation of the Ohře Rift. The volcanic rocks consist of complexes of basic to acidic rock types. The Upper Cretaceous to Tertiary volcanism is characterized by two intraplate magmatic series: the older (75–50 Ma) unimodal ultramafic, ultra-alkaline melilite-bearing series, and the younger (40–18 Ma) bimodal (basanite – phonolite) alkaline rock series; the latter being characteristic of highly volcano-active rifts (Ulrych and Pivec, 1997).

This study is focused mainly on the Fe-Ti oxides occurring in the following basic neovolcanic rocks: basanite, tephrite, trachyte, basalt. In these rocks, the Fe-Ti oxides costitute important, first crystallizing minerals. The elemental composition of the Fe-Ti oxide phases has been studied in polished thin sections employing an energy-dispersive system Link ISIS 300 equipped with an electron microscope CamScan IV. The was operated at an accelerating voltage of 15 kV and sample current of 2.5 nA.

The oxide minerals were distinctly visible in silicate matrix on the BSE images, which also revealed the presence of chemically distinct lamellae or cores within some grains. The oxide weight percentages obtained by chemical analysis were recalculated to empirical formulae based on the assumption of 3 cations and 4 oxygens per formula unit (p.f.u.) in spinel group minerals, and 2 cations and 3 oxygens p.f.u. in ilmenite group minerals, respectively. Such approach allowed determination of contents of both Fe^{2+} and Fe^{3+}. In addition to spot chemical analyses, we have also acquired several elemental distribution maps and line-scans to evaluate the character of zoning in titanomagnetite grains.

Optical microscope observations in reflected light and the BSE images revealed that the spinel-group minerals and ilmenite occur as almost euhedral up to completely anhedral grains from < 5 mm to several hundreds mm in length. Generally, ilmenite-group minerals are less common than spinels. Large spinel grains often contain silicate and apatite inclusions; the latter being frequently subhedral to euhedral. In some samples, spinel phases displaying marked zoning were found (in the basanites from Most, Úpoř - Pohradická hora, Dolánky, Děčín - Bechlejovice, Dobkovičky, Prackovice and in the tephrite from Chvojno); here, the boundaries between the individual zones were either sharp or gradual. Several titanomagnetite grains also contained ilmenite lamellae of various size (in the basanites from Křemý•, Všechlapy, Ústí n. Labem - Bukov, •ďárek, in the tephrite from Velká Javorská and in the trachybasalt from Kukla). In the titanomagnetite grains in some rock samples, the lamellae were rather narrow and abundant, whereas in other rock samples the lamellae were wide and less abundant.

The chemical composition of the ilmenite group minerals is invariable within experimental errors in specific samples. Ilmenite end-member concentration varies only slightly (50.3–51.9 mol.%) even among individual samples, higher variability occurs in hematite (Hem) and geikielite (Geik) end-member contents: Hem ranges between 35 to 45 mol.% and Geik from 4 to 16 mol.%. Chemistry of the spinel group minerals is varyingeven more. There is a difference between larger and smaller titanomagnetite grains in certain thin section as well as a significant variation in chemical composition between margins and cores in some larger grains in several samples. Most titanomagnetites are characterized by $Mg/(Mg + Fe^{2+})$ ratio between 0.00 and 0.25, $Cr/(Cr + Al)$ ratio below 0.2, and $Fe^{3+}/(Fe^{3+} + 2Ti)$ ratio between 0.2 and 0.6. Such chemical composition corresponds well with the data for titanomagnetites from basaltic rocks given in literature (Lindsley, 1991). All these ratios have been usually higher in the chromium-rich cores of some titanomagnetite grains compared with their marginal zone. Besides these two types, however, there are some spinel group phases having $Mg/(Mg + Fe^{2+})$ ratio in excess of 0.6 or those with $Fe^{3+}/(Fe^{3+} + 2Ti)$ exceeding 0.9.

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Tectono-Metamorphic Evolution of the Złoty Stok–Trzebieszowice Shear Zone – West Sudetes, SW Poland

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The Złoty Stok - Trzebieszowice shear zone (ZSTSZ), situated in the northern part of the Śnieżnik Metamorphic Unit is NE-SW trending belt which mainly consists of mica schists, gneisses and quartzo-feldspathic schists (the so-called "leptites"). This zone has attracted special attention as an important tectonic boundary identified by Bederke (1929) further to the south as the Variscan Ramzova Overthrust, which separates the West Sudetes and the East Sudetes. Other authors included the ZSTSZ