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Composition of mafic minerals from peralkaline potassic syenites-granite association from Bulgaria

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Several potassic-alkaline Variscan plutons (330 – 305 Ma) outcrop in Kraishite and Stara planina regions in Bulgaria: Lutskan, Svidnya, 7th Prestola Monastery, Buhovo-Seslavtsi, potassic syenites west of Shipka and Shipka (from west to east). These magmatic bodies have intermediate to acid compositions and evolve toward peralkaline syenites-granite residual varieties. They present a broad diversity in rock-forming mineralogy reflecting the variations of magma chemistry and conditions of crystallization. Evolution of mafic silicates in the plutons show unique features which enable to discriminate the trend of mineral evolution in each magmatic complex.

Pyroxenes from Svidnya pluton are presented in all facial types. Its compositions cover the entire spectrum from calcic to sodic varieties as pyroxenes evolve from diopside to aegirine. The clinopyroxenes from peralkaline syenite porphyries in Buhovo-Seslavtsi pluton belong to Ca-Na pyroxenes and their compositions vary from $Wo_{25}-En_{13}-Fs_{13}-Ac_{42}$ to $Wo_{11}-En_6-Fs_2-Ac_{65}$. Pyroxenes from potassic syenites west of Shipka display limited range and belong to pure diopside, whereas pyroxenes in the peralkaline dykes from Shipka pluton are aegirine-augites. Also, aegirine-augite and aegirine from Svidnya and Buhovo-Seslavtsi are enriched in Ti (TiO_2 up to 6.5 wt. %), while aegirine-augite from Shipka shows high Zr content (ZrO_2 up to 2.9 wt. %), as Ti and Zr enter pyroxene structure via $Na(Mg,Fe^{2+})_{0.5}(Ti,Zr)_{0.5}Si_2O_6$ molecule.

Amphiboles from Lutskan and 7th Prestola Monastery are low temperature, reflecting their near-solidus stage of crystallization or postmagmatic reequilibration due to the circulation of deuteritic fluids. Their composition is winchite - riebeckite, and winchite - barroisite, respectively. In turn, amphiboles from Svidnya complex display a narrow compositional variation from richterites to magnesio-arfvedsonite, and rarely eckermanite. Amphiboles in Buhovo-Seslavtsi complex show broad diversity in their composition as they belong to sodic-calcic and sodic groups. They evolve from ferrowinchite, ferrowinchite to richterite and potassic-magnesio-arfvedsonite with [A]-site filled by K. Amphiboles from the potassic syenites outcropping west of Shipka are arfvedsonite, characterised with elevated Ti content (up to 4.4 wt. % TiO_2).

Micas from all complexes show limited evolution. In Svidnya, Buhovo-Seslavtsi, Shipka and 7th Prestola Monastery only biotite is present. Characteristic feature of biotites from Shipka is the

elevated fluorine content (up to 5 wt. % F) which coupled with presence of fluorite implies on the F-dominance in the fluid phase during the crystallization of the rocks. In Lutskan and in the syenites west of Shipka micas show broad range of variation from phlogopite to biotite.

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