PETROLOGY OF THE SAMSUN LAMPROPHYRES: CENTRAL PONTIDES–TURKEY

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Introduction: The Pontides extend from northwest to northeast of Turkey along İzmir–Ankara–Erzincan Suture Zone (IAESZ) and divided into three parts as western, central and eastern Pontides according to the differences of the basement units [1–4]. Pontides are formed due to closure of Neo-Tethyan Ocean. As a result of this event, the Pontides has undergone intense magmatism which play an important role in the shape of the region. Magmatism has different geochemical characteristics ranging from calcalkaline upto alkaline in nature. Latest stage of extensive magmatism is represented by alkaline units in local areas within Pontides, like all other tectonic units of Turkey. Some alkaline units are extremely enriched in potassium and have ultrapotassic in character. Ultrapotassic units of the Pontides defined as as lamprophyres. Lamprophyres are useful indicators for understanding the evolution of subduction. They are found as dykes and sills within Pontides. Lamprophyres units are exposed around Kalecik [5, 6], Sinop [7], Bolu [8], Gümüşhane [9, 10], Trabzon [11] and Rize [11] within Pontides. Apart from these localities, lamprophyres have been recently defined in the vicinity of Samsun which is named as "Samsun lamprophyres". They are dyke shaped body and cut the sedimentary units such as marl, limestone and clayey limestone. They have sharp contact with the clayey limestone in most part of the outcrops. There are no researches about petrogenesis, formation conditions, genesis, tectonomagmatic evolution and also no explanations refer to the question "Why alkaline lamprophyres are only formed within Central Pontides" in former geological researches of the region.

Mineralogy and Petrography: Lamprophyres are dark green in colour and have porphyritic texture in hand specimen. They have hypocrystalline/holocrystalline porphyritic texture and mainly composed of augite, anorthite, phlogopite, magnetite as a phenocrystal. Samples also include zeolite minerals. According to Confocal Raman Spectroscopy (CRS) studies, augite phenocrystal octagonal and prismatic euhedral in form, most of them have sectoral zonation and have strong Raman shift in 1008 cm^{-1}, 662 cm^{-1}, 530 cm^{-1}, 386–360–323 cm^{-1} and weak peaks in 1040 cm^{-1}, 914–869–818 cm^{-1}, 183–136–112 cm^{-1}. Some augite crystals have altered to actinolite as a result of uralitization. Anorthite minerals euhedral prismatic in shape and have Raman shift in 559–524–502–484 cm^{-1}, 339 cm^{-1}, 284 cm^{-1}, 197–183–144 cm^{-1}. Plagioclase crystals show negligible amount of sossuritization. Phlogopite minerals occur as a microcrystal and have Raman shift in 1011 cm^{-1}, 776 cm^{-1}, 667 cm^{-1}, 514 cm^{-1}, 266–185 cm^{-1}, 92 cm^{-1}. Magnetite formed as primary and secondary in the result of opacitization of augite minerals and have Raman shift in 663 cm^{-1} and 526 cm^{-1}. As a result of petrographic studies, these rocks are classified as a camptonite.

Petrology: SiO_2 and total alkali $(Na_2O + K_2O)_t$ contents of lamprophyres are between 44–48 wt. % and 5.5–7.3 wt. %, respectively. Mg–numbers of lamprophyres are rangeing from 18 up to 28. Decreasing of MgO, CaO, Al_2O_3, with increasing silica suggest fractionation of plagioclase, pyroxene, phlogopite and magnetite. Lamprophyres display a range of K_2O contents (2.5–3.6 wt. %) and Na_2O (2.9–4.3 wt. %) that reflect high K, shoshonitic and alkaline lamprophyre affinities. These rocks show enrichment in LILE and LREE relative to HFSE and HREE.

Conclusion: Geological, petrographical and geochemical data obtained from lampyrophyres and their contact rocks suggest that Samsun lamprophyres are alkaline lamprophyres, with type III ("orogenic") character and resemble Roman Province Lavas.

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