

Mineral Chemistry of Barium and Titanium-Bearing Biotite in Alkaline Trachyte from Upper Benue Valley (Northern Cameroon)

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Abstract : Barium and titanium bearing biotite from alkaline trachyte of Upper Benue valley, Northern Cameroon is studied. The iron enrichment index of mica (average I.E.=0.40) is intermediate between annite and phlogopite. The biotite phenocrysts contain up to 6.2 wt. % BaO and 9.8 wt. % TiO₂. The BaO content of electron-microprobe mica is positively correlated with the Al₂O₃, TiO₂, and FeO contents, and negatively correlated with the SiO₂, K₂O, and MgO contents. Ba and Ti rich micas are generally found in SiO₂ deficient rocks, whereas Ba and Ti bearing mica in this study occur in silica-saturated rocks. Most of the phenocrysts analysed have deficiencies in their octahedral and interlayer sites. Deficiencies in the octahedral sites may arise from the Ti vacancy and partly the Ti tschermakite substitution. On the other hand, deficiencies in the interlayer-site are due to the replacement of K by Ba. The substitution mechanism in the Upper Benue valley mica is characterized by Ba + 2Ti + 3Al = (K + Na + Ca) + 3(Mg + Fe + Mn) + 3Si, with an excellent correlation coefficient. Biotite compositions from the Upper Benue valley area fall between the quartz-fayalite-magnetite (QFM) and nickel-nickel-oxide (NNO) oxygen fugacity buffers. All these show that Upper Benue valley mica with high Ba and Ti contents may be formed from magmas rich in these elements.

Keywords : Benue valley, trachyte, biotite, mineral chemistry, enrichment

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