



**ADDIS ABABA UNIVERSITY SCHOOL OF EARTH SCIENCES**

**Title: Petrologic and Petrographic Investigation of the Chewokare  
Volcanic Rocks, Southern Ethiopia**

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## Declaration of Originality

I hereby declare that the thesis is my original master's degree work under the supervision of Prof. Dereje Ayalew, School of Earth Sciences, Addis Ababa University during the year 2018. I further declare that this work has not been presented or submitted to any other university or institution for the award of any degree or diploma. All sources and materials used for the thesis have been duly acknowledged.

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## Abstract

Chewokare magmatic complex is situated in north of Lake Abaya NW continuity of Southern main Ethiopian rift with in Ganjuli graben bounded by post Hobicha and recent most felsic sources of Saluwa-Dere Hoko domes. The current studies focus on Petrology, petrography and geochemical aspect of Chewokare volcanic units. The Chewokare Volcanic rocks formed by two main phase of eruption; post Hobicha caldera forming eruptive activity and the most recent Saluwa Dere-Hoko felsic complex eruptive activity. The volcano tectonic evolution was started in early Miocene and which has been progressed to Plio-Pleistocene and most active rifting part is evident of Quaternary activity.

Based on geochemistry the Chewokare volcanic rock classified in to alkaline to mildly subalkaline basalt, felsic products especially trachy andesite and trachy dacite. Major and trace elements geochemical data very important use to discriminate the type magmatic processes that involved during evolution of any type of volcanic product. Different major and trace data show there is two main processes determine the evolution of Chewokare volcanic rocks; fractionation and little crustal contamination. The diagrams of Nb-Zr and Hf-Th form a slightly positive correlation by forming a linear slope that show the genetic relationship or co-genetic nature of the units.

Negative correlation of FeO<sub>t</sub> and MgO with SiO<sub>2</sub>; the first phase of crystallizing minerals are early formed one like Fe and Mg bearing mineral phases (eg, Olivine and Pyroxenes). The other phase that fractionate from the system is plagioclase feldspar that evidently indicated by the late dropping of CaO and Al<sub>2</sub>O<sub>3</sub> trend line after some concentration of SiO<sub>2</sub>. The contamination index (La/Nb) ratio 2.17 this good indicator of contamination by crustal material and also the diagram La/Nb against MgO and Th/Ta or La/Nb against SiO<sub>2</sub>; which show inclined trend suggest acontamination. In general fractional crystallization involved with a minor crustal material involvement.

**Key words:** Chewokare and Abela volcanic Complex, Fractional crystallization, Crustal contamination, Caldera forming eruption and Southern Main Ethiopia Rift.

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