

Composition and Geothermometry of Chlorite Replacing Biotite in Naqadeh and Pasveh Granitoid Intrusions

S. Alavi^{1*}, A.A.T. Shabani², S. Niroomand³, F. Tecce⁴

1-Research Center for Earth Sciences, Geological Survey and Mineral Exploration of Iran

2- Faculty of Earth Sciences, Kharazmi University, Tehran

3- Department of Geology, College of Sciences, University of Tehran, Tehran

4-Istituto Geologia Ambientale e Geoingegneria, C.N.R., Rome, Italy

(Received: 3/2/2013, in revised form: 28/5/2013)

Abstract: Chemical analyses of chlorite flakes, as a product of alteration of biotite in the Eocene granitoid rocks of Naghadeh and Pasveh intrusions have been accomplished by electron microprobe for major elements. Based on 53 point analyses of chlorites from 13 rock samples, their mean structural formula recalculations display that Si cation numbers are less than 5.97 atoms per formula unit (apfu), and the sum of octahedral cations is very close to 12 both an indication of trioctahedral chlorite. The calculated mole fraction of chlorite in interlayered phase, X_c , ranges from 0.86 to 0.94 confirming the purity of chlorite, i.e., the study chlorites are completely free of any smectite layers. Compositional variations in chlorite are strongly controlled by host biotite and rock type. Chlorite samples from Pasveh intrusion have Fe/(Fe+Mg) ratio ranges from 0.75 to 0.85 and Si contents from 5.14 to 5.69 apfu; those from Naqadeh intrusion possess Fe/(Fe+Mg) ratio ranges from 0.39 to 0.49 and Si contents from 5.45 to 5.97 apfu leading to the classification of chlorites mainly as ripidolite and pychnochlorite respectively. All major elements in the chlorite are strongly correlated with each other. Moreover, Fe/(Fe+Mg) ratio in biotite is well preserved by chlorite. Chlorite geothermometry based on the variation in tetrahedral Al content and Fe/Fe+Mg ratio within the chlorite structure shows a large variation in temperatures from 299 to 399 °C with an average of 345 °C for Pasveh intrusion and from 270 to 350 °C with an average of 320 °C for Naqadeh intrusion; both mean temperatures correspond with the mean temperatures of chlorite crystallization in a number of granitoid rocks of the world.

Keywords: chlorite; biotite; alteration; granitoid; Naqadeh; Pasveh.

متن فارسی اصل مقاله از صفحه ۳۹۳ تا ۴۰۴ در این شماره به چاپ رسیده است.

* Corresponding Author, Tel: 09144164215 E-mail: zantia20042005@yahoo.com