Magmatic Epidote in Calcalkaline tonalite, Dehnow (NW Mashhad, NE Iran)

R. SAMADI[1], S. J. SHEIKH ZAKARIAEE[1] AND N. SHIRDASHTZADEH[3]

[1]Department of Geology, Science and Research Branch, Islamic Azad University, Tehran, Iran
[2]Department of Geology, Facualty of Science, University of Isfahan, Isfahan, Iran

Introduction

The granitoids of Dehnow in NE Iran are part of a calc-alkaline stock (tonalite to granodiorite and diorite) that intruded the remnants of the Paleo-Tethys Ocean in the Triassic [1]. Epidote is commonly known as primary igneous mineral in intermediate plutonic rock [2]. In Dehnow granitoid it occurred as inclusions in the phenocrystic garnet grains or as subhedral grains associated with biotite.

Mineral Chemistry

The major element composition of epidote indicates a Xep (Fe/(Fe+Cr+Al-2)) between 0.43 to 0.65. The average pistacite (Ps) component of the epidote is 0.15 and 0.18 for the inclusions in the garnets and Dehnow granitoid, respectively.

Disscusion and Conclusion

Textural criteria may be used to distinguish magmatic and subsolidus (deuteric) epidotes. [3] and [4] argued that euhedral, weakly pleochroic epidote enclosed within biotite is magmatic. The low TiO_2 contents (<0.17%) of most epidote inclusions and epidote in the groundmass suggest that they are primary according to [5], who ascribe TiO_2<0.2% to primary epidote. Based on [6], the Ps values indicate a low fO_2 condition but suggesting that the epidote inclusions crystallized under relatively lower fO_2 conditions.

[1] Samadi *et al*. (2013) Island Arc (Submitted). [2] Dessimoz & Müntener (2009) Goldschmidt A286. [3] Tulloch (1979) Cont Min Pet **69**, 105-117. [4] Zen & Hammarstrom (1984) Geol **12**, 515–518. [5] Evans and Vance (1987) Con Min Pet **96**, 178–185. [6] Sial *et al*. (1999) Pak J Sci Ind Res **42**, 342-244.

Geochemical and isotopic studies of the Hooghly River Estuary, India: Natural vs. anthropogenic sources of organic carbon

SAUMIK SAMANTA[1], TARUN K. DALAI[1]* AND JITEDNRA K. PATTANAIK[1]

[1]Department of Earth Sciences, Indian Institute of Science Education and Research-Kolkata, Mohanpur 741252, INDIA (*correspondence: dalai@iiserkol.ac.in)

Dissolved, suspended and bed loads have been sampled sesonally from the Hooghly River Estuary, the major distributary of the river Ganga. The samples have been analyzed for pH, temperature, TDS, salinity, major ions, $\delta^{18}O$ of water and $\delta^{13}C$ of dissolved inorganic carbon (DIC). The results show clear seasonal variations, wth lower concentrations of major ions during the monsoon period when the water discharge is the highest. Based on salinity- $\delta^{18}O$ variation trends, which are similar to those observed earlier [1], freshwater can be characterized by $\delta^{18}O$ values of ca. -6‰ and ca. -7‰ during the summer and monsoon periods, respectively. This suggests that overall contributions of rainwater to the Hooghly River dominates over those from snow melt in the upper reaches. Calculations made for mixing of seawater and river water suggest that at Gangasagar where the the river drains into the Bay of Bengal, freshwater constitutes ca. 15% and 30% of the water budget during summer and monsoon periods, respectively.

Salinity shows well correlated linear variations with DIC and $\delta^{13}C_{DIC}$ which indicate that mixing exerts the major control on DIC abundances. Based on these trends, it is inferred that $\delta^{13}C_{DIC}$ of freshwater is ca. 1.5‰ lower during monsoon period than in summer. However, $\delta^{13}C_{DIC}$ values are in general lower than those expected due to conservative mixing. Although calcite precpitation may be one of the underlying causes, this seems unlikely in the Hooghly estuary. A more likely explanation is supply of addtional organic carbon to the estuary, oxidation of which could add to DIC pool. The source of such organic carbon is most likely pollution and needs to be assessed. $\delta^{13}C_{DIC}$ data of this study suggest that processes such as outgassing of CO_2 from the waters and biological productivity are insignificant in regulating the DIC variation in the estuary.

[1] Somayajulu *et al*. (2002) *Mar. Chem*. **79**, 171-183.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.19