

## The importance of K, Ca and B metasomatism in generation of intergrowth and overgrowth textures: an example from the Alvand plutonic complex, Hamedan, Iran

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The study area is a part of the Sanandaj-Sirjan metamorphic belt comprising low to high grade regional (orogenic) and thermal (contact) metamorphic rocks, intruded by felsic, intermediate and mafic plutonic bodies. Major plutonic rocks of the region are granitoids, diorites and gabbroids, intruded by aplo-pegmatitic and silicic veins. The primary chemical and mineralogical compositions of rocks are partly to completely changed due to metasomatic processes. These processes have been usually occurred in the presence of fluids with or without melts. The mobile elements such as K, Na, Ca and B have been more frequently involved in fluids-rocks interactions. In spite of a magmatic origin for plutonic rocks and some of their intergrowth textures, various textures of metasomatic origin are common, too.

Some features which could be related to metasomatic processes in the region are:

Overgrowth of K-feldspar on plagioclase (anti-rapakivi texture) forming due to K-metasomatism in granodiorites; Remnant islands of primary plagioclase in secondary K-feldspar (specially in microcline) resulting from K-metasomatism in granodiorites and monzogranites; Wartlike myrmekite formed in adjacent to K-feldspar crystals due to Ca-metasomatism in granodiorites and monzogranites; Partly to completely substitution of K-feldspar (specially-microcline) by tourmaline due to B-metasomatism; Diversity in the chemical compositions of metasomatized and unmetasomatized rocks; Normal correlation between the spatial distribution of the fault zones and frequency of the metasomatized rocks.

According to Phillips (1974) and Collins (1988), a metasomatic origin is probable for myrmekites of the studied rocks. Also, field and petrographic evidence confirm a metasomatic origin for studied anti-rapakivi and tourmaline-feldspar intergrowths. Considering field observations, petrographical and geochemical studies, I suggest that the study area have been undergone multi-stage metasomatic processes.

### References

- Phillips, E. R. (1974): Myrmekite\_ One hundred year later, *Lithos*, 7, 181-194.  
 Collins, L. G. (1988): Hydrothermal differentiation and myrmekite\_ A clue to many geological puzzles, Theophrastus Publications, Athens, 387 P.

## Seasonal change in Eh-pH condition of natural water and consistency between Fe and Ce concentrations

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### Introduction

Iron in the hydrosphere are supplied from rock-forming minerals in the course of chemical weathering; its mineral and ionic equilibria are thermodynamically dominated by pH and Eh. Cerium is also affected by these two. Ce anomaly has been, however, considered as a proxy of the condition, but sometimes as a tracer of the original source. It is important to monitor Eh and pH for the elucidation of circulation and mobility of these elements. However, some problems involved with the measurement and interpretation of Eh values have been reported. In this study, we have observed characteristic seasonal changes in Eh and in the concentrations of Fe in natural water. To examine the accuracy of Eh, it was re-evaluated in terms of pH, and Fe and Ce concentrations.

### Samples And Analysis

Samples were surface waters from 19 sites around Ozenuma lake collected during May 2002 and October 2002 and ground water from Senjougahara peatland collected during December 2001 and April 2003. Measurements of pH, Eh and temperature were carried out in situ with a portable pH meter equipped with a pH electrode or an ORP electrode. Fe concentrations were determined with ICP-AES in laboratory. For the evaluation of Eh data, Ce data from earlier papers were used together with Fe and pH data.

### Results And Discussion

At both sites, Eh was lower in the thaw season, increased in summer, and decreased from the fall to winter (snow season) again. Fe concentrations was increased between fall and thaw season, being synchronized with the change in Eh. The consumption of O<sub>2</sub> by microbial activities and limited supply of O<sub>2</sub>, during the time when snow or water covered soils, would be the direct cause of the change in Eh as well as Fe concentration.

Measured Eh showed a loose correlation with Eh<sub>calc.</sub> which was calculated based on the pH-Eh equilibrium of Fe. To judge the accuracy of the measured Eh data, reported Fe, Ce and pH data were re-examined with respect to the pH-Eh condition. It was found that the Eh<sub>calc.</sub> from the Fe data shows a good correlation with those from Ce data. It seems likely that both Fe and Ce concentrations in natural water are controlled by the single pH-Eh condition, suggesting that the redox condition of natural water could be better understood by Fe (or Ce) data than the Eh measurement.