Geochemistry and tectonic studies of metavolcanics of Um Anab area, North Eastern Desert, Egypt

B.M. AMIN, M. E[1]-TOKHI AND S. ALAABED

Geology Department, College of Science, UAE University. P.O. Box 17551, Al Ain, United Arab Emirates (bahaa.mahmoud@uae.ac.ae)

The volcanic history of the Neoproterozoic belt in the Eastern Desert of Egypt encompasses two major magmatic episodes. An earlier (950-750 Ma) produced the Shadli metavolcanic assemblages, and a younger episode (680-550 Ma) produce the Dokhan volcanic rocks. Um Anab metavolcanics (UAV), represent one of the significant metavolcanic suites in the southern part of the Nubian Shield. They mainly show range in composition form amphibolites, meta-andesites, metafelsites to metarhyolites, in which meta-andesites are more abundant than the other rock varieties. The studied rocks have undergone alteration as a result of low-medium grade metamorphism under conditions of the greenschist - amphibolite facies. Geochemistry, Um Anab metavolcanics have a transitional character from tholeiite to calc alkaline. The meta-andesites, metafelsites and metarhyolites varieties are predominantly of calc-alkaline nature. The studied metavolcanic are enriched in LILE and depleted in HFSE, with a pronounced negative Nb anomaly. Thus the UAV is most probably derived from a mantle source produced in an island arc environment where fall in the plate margin field confirming the orogenic nature of these rocks.

Adsorbate effects on aqueous aging of nano-sized zerovalent iron (nZVI) particles

J.E. AMONETTE[1]*, P. NACHIMUTHU[1], C.K. RUSSELL[1], D.R. BAER[1], P.G. TRATNYEK[2], A. DOHNALKOVA[1], C.M. WANG[1] AND J.T. NURMI[2]

[1]Pacific Northwest National Laboratory, Richland, WA 99352, USA (*correspondence: jim.amonette@pnl.gov)

[2]Oregon Health & Science University, Portland, OR 97006, USA (tratnyek@ebs.ogi.edu)

Surfaces of nZVI particles undergo major changes upon contact with water that progressively affect their reactivity with solutes. Reduction of the Fe (III)-oxide shell and oxidation of the Fe (0) core release Fe (II) to solution and can lead to formation of new phases. The nature and rate of these changes depend on the molecular-scale interactions between solute molecules and reactive sites at particle surfaces. We conducted experiments under anoxic conditions to determine the effect of different solutes on the rate at which nZVI particles are transformed. Replicate suspensions of TODA RNIP nZVI particles were prepared in deoxygenated-deionized (DODI) water in the presence of various solutes including natural organic matter (NOM), 3-(N-morpholino)propanesulfonic acid (MOPS, pH 7.2), and hydrogen phosphate (HPO4, pH 7.2), and then incubated at room temperature for periods up to 8 weeks. Periodically, replicates were flash-dried and reaction progress determined by analysis of the filtrate composition [pH, Fe (II)], and of the solid phase composition [micro-X-ray diffraction, transmission electron microscopy]. A strong inhibiting effect of NOM, relative to DODI water, was observed that scaled with NOM concentration. MOPS actively promoted dissolution of all phases present in the RNIP particles, including magnetite. Dilute HPO4 solutions substantially inhibited transformation and, at higher concentrations, resulted in the formation of vivianite [Fe_3 $(PO_4)_2 \cdot 8H_2O$]. These results will be interpreted in terms of relative sorption affinities, aqueous Fe (II) complexation constants, and solid phase solubilities.