Cyanide and thiocyanate biogeochemistry in non-polluted natural aquatic systems

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Here, we report on the accumulation of high levels of cyanide as free cyanide, complexed cyanide, iron-cyanide, and thiocyanate in sediments of the non-polluted Delaware Great Marsh (up to 230 μmol kg^{-1}). Free cyanide at concentrations which are toxic to aquatic life (up to 1.92 μmol L^{-1}) were detected in sediment pore-waters, and the concentration of total (free and complexed) cyanide in the pore waters was found to be as high as 6.94 μmol L^{-1}. The presence of hydrogen cyanide in the salt marsh sediments is attributed to processes associated with decomposition of cord grass *Spartina alterniflora* roots. The formation of iron-cyanide complexes and their adsorption onto sedimentary organic matter provide a temporary sink of cyanide, but the ultimate cyanide sink is associated with the formation of thiocyanate by reaction with sulphide oxidation products, principally polysulfides, formed by reaction with by Fe(III) minerals. The formation of thiocyanate by this pathway detoxifies two poisonous compounds, polysulfides and hydrogen cyanide, in the salt marsh sediments [1]. Thiocyanate is stable under anoxic conditions, but diffuses freely through sedimentary pore waters to upper oxic sediment layers, where it may be oxidized by biologically assisted processes either to carbonyl sulfide and ammonia or to cyanate and hydrogen sulfide. Thiocyanate was also detected at concentrations up to 288 nmol L^{-1} in the water column of Lake Rogoznica (Croatia) [2] and up to 274 nmol L^{-1} in the water column of Fayetteville Green Lake (NY). Here, thiocyanate appears to be produced in the sediment and diffuse towards the chemocline, where it is consumed by abiotic or biologically enhanced oxidation.

[1] Kamyshny *et al*. (2013) *Aquat Geochem* **19**, 97-113. [2] Kamyshny *et al*. (2011) *Mar Chem* **127**, 144-154.

Petrogenesis and tectonic setting of the Nasrand granitoid pluton, southeast of Ardestan

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The Nasrand pluton of Oligo-Miocen age, which is located in south-east of Ardestan, intruded into Eocene volcanic rocks of the Urumieh-Dokhtar magmatic belt. This pluton consists mainly of granite and granodiorite, and has been intruded by a series diabase dikes. The nasrand plutonic rocks are metaluminous, with mineralogical and geochemical characteristics of I-type calc-alkaline to high-K calc-alkaline granite. They are characterized by enrichment of LREE and LILE, depletion of HREE and HFSE, negative anomalies of Ti, Nb, P, Ba, and positive anomalies of U, K, Th, Rb, Ba, associated with high Ba/Nb ratio and interpreted to reflect emplacement of the plutonic rocks in an active continental margin. The Nasrand granitic pluton and its diabase dikes were all derived from partial melting of the lower continental crust, but it seems that the granitic rocks are slightly more fractionated than diabase dikes and may be modified by assimilation of upper crustal materials.

Keywords: Ardestan, I type granite, calc-alkaline, diabase dikes, active continental margin.

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