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Preliminary studies on V(III) determination in the form of picnolate complex using HR ICP-MS

Lucija Knežević¹, Jelena Mandić², Igor Živković¹, Dario Omanović¹, and Elvira Bura Nakić¹

¹Ruđer Bošković Institute, Bijenička cesta 54, 10 000 Zagreb, Croatia (lknezev@irb.hr)

²Institute of Oceanography and Fisheries, Šetalište Ivana Meštrovića 63, 21000 Split, Croatia

In the environment vanadium(V) is found in three oxidation states (III, IV and V) depending on physico-chemical conditions (pH, Eh, ionic strength, its concentration, biology, organic matter content ect.) of certain environmental medium [1]. Knowledge of V species distribution is to this date very scarce due to its complex aquatic chemistry as well as modern analytical instrumentation constraints [2,3]. Especially, methods on accurate V(III) species determination in complex environmental matrices are poorly developed which makes estimation of V biogeochemical cycle incomplete. It is known that V(III) is expected to be stable in strongly anoxic or euxinic conditions, such as sulphide-containing water samples or sediments. Furthermore, high affinity towards adsorption on various colloids found in natural aquatic systems as well as formation of strong complexes with various organic ligands is presumed. Possible formation of V(III) in certain aquatic environments can contribute to removal of V into sediments [2]. Therefore, determination of V(III) in natural environmental samples is highly needed for accurate estimation of V bioavailability, mobility and toxicity.

Method developed by Yatirajam et al. (1979) was used in order to establish V(III) stability in various model solutions [4]. Procedure is based on the formation of selective complexes of V(III) and picnic acid in respect to V(IV) and V(V) species present in samples. Upon complexation, V(III) species are then extracted into chloroform. Extracts were evaporated to dryness and the remaining content was dissolved in 2% HNO₃. Samples were then measured using HR ICP-MS analytical instrumentation. For measurements using spectrophotometry, samples were measured immediately upon extraction. Studies so far show good selectivity, reproducibility and accuracy which offers a promising method for V(III) determination in natural samples. Stated findings are planned to be further applied on natural anoxic sediment samples of Mljet and Rogoznica lakes (Croatia).

Literature:

- Huang, J.H.; Huang, F.; Evans, L.; Glasauer, S. Vanadium: Global (bio)geochemistry. *Chem. Geol.* **2015**, *417*, 68–89, doi:10.1016/j.chemgeo.2015.09.019.
- Gustafsson, J.P. Vanadium geochemistry in the biogeosphere –speciation, solid-solution interactions, and ecotoxicity. *Appl. Geochemistry* **2019**, *102*, 1–25,

doi:10.1016/j.apgeochem.2018.12.027.

- Costa Pessoa, J. Thirty years through vanadium chemistry. *J. Inorg. Biochem.* **2015**, *147*, 4–24, doi:10.1016/j.jinorgbio.2015.03.004.
- Yatirajam. V, Arya, S.P. EXTRACTION DETERMINATION AS VANADIUM (II) OF VANADIUM. *Talanta* **1978**, *26*, 60.