

DIRECT DETERMINATION OF DISSOLVED URANYL(VI) IN SEAWATER BY CATHODIC STRIPPING VOLTAMMETRY

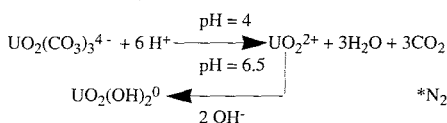
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The dissolved uranyl(VI) is present in seawater at an almost constant concentration of 3.3 µg/l (KU *et al.*, 1977). It has been accepted that the anionic uranyl(VI)-tricarbonato complex $UO_2(CO_3)_3^{4-}$ is the predominant chemical form of dissolved uranyl(VI) in seawater (DJOGIC *et al.*, 1986). As a consequence of ion pairing reactions, the complex could be more precisely described as $Na_2(UO_2(CO_3)_3)^{2-}$. At an elevated hydrogen peroxide concentration (in euphotic zone) uranyl(VI) appears partially as a mixed uranyl-dicarbonato-hydrogenperoxo complex $UO_2(CO_3)_2(HO_2)^{3-}$ (DJOGIC and BRANICA, 1991). This study has been performed to develop the simple electrochemical procedure for quantitative determination of uranyl(VI) in natural seawater samples.

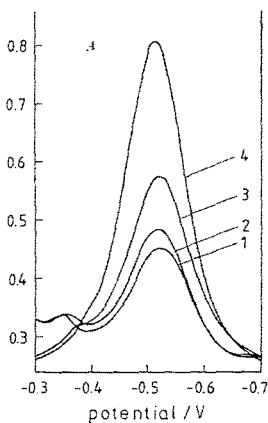
Solubilities and mobilities of various uranyl(VI) species which exist under the nuclear waste disposal conditions, as well as their adsorption on soil particles and their leaching into waters are very important environmental problems. Because of this, the need of a direct method to determine the concentration of uranyl(VI) in natural waters is of great prominence. To accomplish this, it is necessary to clarify the mechanisms of uranyl(VI) physico-chemical processes in natural water.

Negative highly charged ion of uranyl(VI)-tricarbonato complex is not adsorbed on the solid particles and sediments in marine environment. In accordance with its solubility, adsorption at the electrode surface is not possible. To transform this species into an adsorbable one, the destruction of carbonato complexes and formation of uncharged uranyl species is needed. This process is achieved according to the following equations.



* by bubbling N_2 carbon dioxide was eliminated from sample in the electrochemical cell.

This uncharged hydrolyzed uranyl(VI) species is favored to be adsorbed at the electrode surface (DJOGIC and BRANICA, 1994). Consequently by this procedure uranyl(VI) is transformed in such a way that its concentration can be determined by square wave cathodic stripping voltammetry. The standard addition method (Fig.1), can be successfully applied at very low concentration such as 10^{-8} mol l⁻¹ in which uranyl (VI)-ion is present in seawater. The results from different stations of seawater samples will be discussed.



REFERENCES

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Fig. 1A : A SWCV Voltamograms in seawater (acidified to pH = 4 and adjusted to pH = 6.5 at different uranyl(VI) concentrations (1) seawater samples, (2) $4,8 \times 10^{-9}$, (3) $9,6 \times 10^{-9}$, (4) $2,56 \times 10^{-8}$ mol l⁻¹

Fig. 1B : Dependence of SWCV peak current on uranyl(VI) concentrations in natural seawater

