

The complex mixture of organic matter in the sea comprises of different types of substances such as polysaccharides, proteins, peptides, lipids and humic substances. Most of these compounds (about 70 % of total organic carbon) are surface active, i.e. show a tendency to be concentrated by adsorption processes at the natural phase boundaries of water with the atmosphere, and with solid particles such as sediment, and biota.

In seventies new electrochemical methods were developed for research and monitoring of organic substances with surface active properties in the sea (ZVONARIC *et al.*, 1973; COSOVIC *et al.*, 1977; COSOVIC and VOJVODIC, 1982). The methods are based on measurement of adsorption phenomena at the electrode surface at conveniently selected conditions of potential, time of adsorption and transport mode. This enables a simple, rapid and direct determination of organic surface active substances in marine samples without any pretreatment of the samples. The methods have been widely used in the Adriatic Sea with the aim of determining natural levels of surface active substances, their seasonal variations, horizontal and vertical distributions, and pollutions influences (including also effects of intensive phytoplankton blooms in the North Adriatic Sea).

Special attention was paid to the determination and characterization of the hydrophobic fraction of organic surface active substances. It was found that enrichment of hydrophobic substances at natural phase boundaries is several times higher than for the total dissolved organic matter, thus influencing the mechanisms and rates of processes that occur at natural surfaces (COSOVIC and VOJVODIC, 1989).

Recently attempts are made to compare the surfactant activity values of the seawater samples in the North Adriatic Sea with the corresponding DOC values, which are determined by using a high-temperature catalytic oxidation (HTCO) technique, proposed by SUZUKI and SUGIMURA (SUGIMURA and SUZUKI, 1988).

We expect that reliable information may be obtained which will contribute to the knowledge of chemical composition and reactivity of organic substances in marine and estuaries systems.

## REFERENCES

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In a complexed electrolyte solution such as seawater the mixed complexes of uranyl can dominate over simple complexes in respect to the medium containing different types of ligands. One of the possible solution of this problem is based on theoretical modeling constants of mixed complexes.

DYRSSEN *et al.* (1968) model predicts the magnitude of mixed-ligand formation constants,  $\beta_{a,b}$ , from single-ligand type formation constants,  $\beta_N$ . Since seawater contains a variety of potent ligands, and mixed-ligand complexes are statistically favored relative to single-ligand type complexes, recent attempts to model trace-metal complexation in seawater have included calculations of stability constants of the following type:

$$\beta_{a,b} = \frac{(M^x Y^y)_b}{(M)(X)^a (Y)^b} = \frac{N!}{a!b!} (\alpha \beta_N^a \gamma \beta_N^b)^{1/N}$$

where:

$$N = a + b; \quad x \beta_N = \frac{(M^x)_N}{(M)(Y)^N} \quad y \beta_N = \frac{(M Y^y)_N}{(M)(Y)^N}$$

On the basis of this calculations the stability constants of the mixed uranyl-hydroxo-peroxo-carbonato species has been evaluated.

Including those equilibria and their corresponding stability constants into the developed model of seawater species distributions (DJOGIC *et al.*, 1986) the pH dependence of uranyl-species has been obtained.

The calculations show that a significant percentage (20 to 30%) of uranyl species should be in the form of a uranyl mixed complexes of ligands, such as -OH, -CO<sub>3</sub>, especially in the pH range 6 to 8.

The calculations performed for the photic zones where the hydrogen peroxide is present as a potential ligand (DJOGIC and BRANICA, 1991), indicate the presence of the uranyl complexes with peroxide, as well.

## REFERENCES

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