

C-5

ADVANTAGES OF DIRECT METHODS IN DETERMINATION OF
SURFACE ACTIVE SUBSTANCES IN NATURAL WATERS

Božena ČOSOVIĆ and Vjeročka VOJVODIĆ

Center for Marine Research, Rudjer Boskovic Institute, Zagreb (Yugoslavia)

Analytical problems in analysis of organic matter in natural waters arise mainly because of the fact that organic matter in natural waters represents a complex mixture of different classes of compounds. The method of choice should be enough sensitive for direct determination without pretreatment procedure. This is often not only the question of an improved routine analysis. A qualitatively different determination may result after elimination of different pretreatment procedures such as filtration, separation and preconcentration that usually cause changes in the composition of organic substances initially present in the sample.

Recently, polarography and voltammetry have found many followers in the study of natural and polluted aquatic systems because of their simplicity and possibility of determining trace amounts of different constituents including adsorbable organic substances without labourious analytical procedures. Electrochemical methods can be generally applied for the determination of surface active substances on the basis of the measurements of adsorption effects at the electrode surface. The methods are simple, direct and nondestructive so that it is possible to analyze number of samples immediately after sampling thus avoiding effects that may occur during storage of samples and pretreatment.

Determination of surface active substances by a.c. polarography will be illustrated for sea surface microlayer samples, phytoplankton culture media and freshwater samples.

C-6

VERTICAL DISTRIBUTION OF SURFACE ACTIVE SUBSTANCES IN SEAWATER

Božena ČOSOVIĆ and Vjeročka VOJVODIĆ

Center for Marine Research, Rudjer Boskovic Institute, Zagreb (Yugoslavia)

It is now well known that dissolved and colloiddally dispersed organic matter in the sea may influence the physico-chemical state and processes of other organic and inorganic microconstituents and pollutants.

Organic compounds with surface active properties are concentrated by adsorption processes at phase boundaries of water with the atmosphere, solid particles, and sediment and biota. Surface active substances, both natural and pollutants, modify the structure of the interboundary layers and effect the processes of mass and energy transfer through them.

Adsorption processes have important effects on sedimentation and mineralogy, bubble floatation of particles and enrichment of organic and inorganic material in the sea surface microlayer. The distribution of chemical elements in natural waters is controlled to a great extent by scavenging, or adsorption onto solid surfaces. The role of organic coatings of solid particles in the scavenging processes is still the subject of controversial interpretations because of the scarcity of data on the adsorption effects of different complex mixtures of organic compounds, such as the composition of dissolved and colloidal organic matter in natural waters.

So far, physico-chemical properties and the composition of surface-active substances have been studied mostly in sea-air microlayer samples. Much less information is available on the nature and the amount of surface active material in the water column. In addition to specific methods for the determination of synthetic compounds such as detergents, there has recently been a notable increase in the interest and application of nonspecific methods generally intended for surfactants or to different classes of surface active substances in seawater.

Surfactant activity data will be presented here as measured by a.c. polarography (Čosović and Vojvodić, 1982) in the sea surface microlayer and in samples from open waters of the Western Mediterranean and Southern Adriatic, which were collected at different depths, approximately from 0.5 to 1100 m in the Adriatic and from 0.5 to 2600 m in the Mediterranean Sea. Surface film samples were taken by Garrett's sampler, a 16 mesh stainless-steel screen (85x70 cm). This sampler collects the top 100-150 μ m of the water surface.

It was found that the type and the concentration of natural surface active material vary within different Mediterranean regions and along the depth profile of the water column. The enrichment factors of hydrophobic surfactants in the microlayer with respect to adjacent subsurface waters ranged from 2 up to 100.

Surface active substances were investigated also in the Krka estuary, a karstic river estuary, with emphasis on the determination of the horizontal and vertical distribution of surface active material at salinity gradients. Samples were collected and analyzed seasonally.

We have not found a correlation of surfactant activity with salinity values in the estuarine samples. An increased surfactant activity has been observed in the mixing zone in comparison with samples of both low salinity and high salinity values.

Čosović, B. and Vojvodić, V., 1982. The application of a.c. polarography to the determination of surface active substances in seawater. *Limnol. Oceanogr.*, 27: 361-369.