

Distribution of some heavy metals in the waters along the French Coast of the Mediterranean

by

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Abstract

During 1973-1974 determinations of heavy metals, such as copper, zinc and cadmium, were carried out on the water samples collected from the area along the French coast of the Mediterranean. The results of these measurements are presented.

Résumé

Durant 1973-1974, les déterminations de métaux lourds, tels que cuivre, zinc et cadmium, ont été effectuées sur des échantillons d'eau de mer prélevée le long des Côtes Françaises de la Méditerranée. Les résultats des mesures sont présentés.

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In order to obtain baseline information on the distribution of copper, zinc and cadmium in the sea area located along the French coast of the Mediterranean, the water samples were collected at several shoreline stations between Sète, France and Genova, Italy, as well as at offshore stations and these samples were analyzed for the above-mentioned metals. The collections of the samples at shoreline stations were carried out in June 1973, March, June and September 1974, while those at offshore stations were executed in June 1973 and 1974. The measurements of these metals were conducted by applying an anodic stripping voltammetry.

The general observations made on the basis of the results obtained are summarized below :

Copper. At offshore stations the majority of the results obtained for copper were less than $0.2 \mu\text{g Cu/l}$. Occasionally, higher copper concentrations, up to $1.2 \mu\text{g Cu/l}$ were found at some stations. Exceptionally, a high value of $4.9 \mu\text{g Cu/l}$ was obtained in the surface layer at M-2 station off Monaco in June 1973. At shoreline stations, copper concentrations measured were also generally low. Some high spot values were however, obtained around Marseille, Toulon, Cannes and Savona.

Zinc. The "unpolluted" concentration of zinc in this area lies between 1 and $5 \mu\text{g Zn/l}$. Even at shore-line stations, only a few results exceed $5 \mu\text{g Zn/l}$ when uncontaminated samples were taken. The results on the samples taken from offshore stations show that higher zinc concentrations were found off Sète and Hyères in June 1973, and off Marseille-Toulon in June 1974. The latter might be the result of contamination from industrialized cities.

Cadmium. The unpolluted concentration of cadmium in the seawater in this area does not exceed $0.1 \mu\text{g Cd/l}$. At shoreline stations as well as at offshore stations, only a few results exceed $0.3 \mu\text{g Cd/l}$.

Although most of these higher values are spot values, some of them, such as those obtained at Marseille and Hyères in June 1973, may be considered to be due to the effects of contamination from the cities or industry.

On the basis of these results, the pollution of sea water in the area in question, by copper, zinc and cadmium is considered to be not extensive.

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Discussion

Question : Comment expliquez-vous la présence de Cuivre en concentration élevée en face de Toulon et de Zinc en face de Saint-Tropez?

Réponse (R. FUKAI). There is no explanation. However, it is important to note that such high concentrations of some metals appear suddenly and seem to disappear rather quickly. I am sure that these incidents are related in some way to man's activity.

En ce qui concerne les fortes concentrations de Cu dans l'eau de mer de Toulon, nous pouvons relier ceci aux fortes concentrations de PCB trouvées dans les moules. PCB et Cu sont utilisés dans les peintures; la présence des chantiers navals de Toulon et de La Seyne peuvent très bien expliquer les fortes concentrations en PCB et Cu. De fortes quantités de Cu avaient été notées par Monsieur OREGIONI dans les moules de Toulon. (M. MARCHAND).

No answer required.

Comments : The concentration range which you have found for Cu and Zn along the French Coast is similar to what we have found in the North Adriatic. In the contrary, the concentration range of ionic Cd is a little bit lower with average value of 0.09 $\mu\text{g Cd/l}$. (M. BRANICA).

No answer required.

Résumé de l'intervention : (M. MACCHI).

D. Est-ce que vous avez filtré préalablement les échantillons?

R. Oui.

Commentaire — D'accord, cela peut expliquer pourquoi vous n'avez pas trouvé de grandes différences entre les valeurs obtenues à pH 8 et celles obtenues à pH 5.

No answer required.

J. Georgescu :

1. — Quelle est la sensibilité de la méthode?

z. — Quelle est la quantité minimum d'eau (volume) nécessaire pour effectuer une analyse?

The reply (R. FUKAI)

1. — The sensitivity of the method in terms of the minimum measurable concentration is as follows :

Cu : 0.1 $\mu\text{g/l}$; Zn : 0.1 $\mu\text{g/l}$; Cd : 0.05 $\mu\text{g/l}$; Pb : 0.05 $\mu\text{g/l}$

2. — We use normally 50 ml samples. We may still reduce the volume of the samples, when required.