

On the identification of some neutron induced nuclides in Black Sea water

by

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Summary

Using a high resolution gamma-spectrometry of a Ge(Li) crystal connected with a multichannel pulse-height analyzer of 800 channels, the following nuclides have been identified in the upper layers of the Black Sea at the end of August 1974 : ^{144}Ce , ^{106}Ru , ^{137}Cs , ^{54}Mn , ^{65}Zn , ^{60}Co and $^{110\text{m}}\text{Ag}$. The specific activity of the fission and neutron induced nuclides is very low.

Résumé

En appliquant la méthode de la spectrométrie gamma à l'aide d'un crystal Ge(Li) et d'un analyseur multicanal à 800 canaux, on a identifié dans les couches superficielles de l'eau de la mer Noire à la fin d'août, les radionuclides suivants : ^{144}Ce , ^{106}Ru , ^{137}Cs , ^{54}Mn , ^{65}Zn , ^{60}Co et $^{110\text{m}}\text{Ag}$. L'eau de la mer Noire, à 200 m de profondeur, ne donne aucune activité gamma artificielle. Les activités spécifiques : pCi^{65}Zn : $\mu\text{gZn/l}$ varient entre 0.014 et 0.35, tandis que $\text{pCi}^{110\text{m}}\text{Ag/l}$: $\mu\text{gAg/l}$ varient entre 0.46 et 1.22.

Introduction

The aim of this work was to extend the field of investigations at about 300 km offshore the romanian coast, where the salinity is increasing and the influence of the great debit of Danube river as well as of marine coastal currents are lower. It will be reported only some results concerning the radioactivity of Black Sea water.

Methods, results and conclusions. Samples of surface water as well as water and sediments of 200 m depth have been collected from the midwest basin of the Black Sea at the end of August 1974. The chemical separation and identification of the radionuclides have been effected after [1] and [2]. Gamma spectrometric measurements were performed making use of a high resolution Ge(Li) crystal of 38 cm³ of 4 KeV at ^{60}Co gamma-rays, connected to a multi-channel analyser of 800 channels SA-42-Intertechnique. It has been identified ^{144}Ce , ^{106}Ru and ^{137}Cs as fission products, while ^{54}Mn , ^{65}Zn , ^{60}Co and $^{110\text{m}}\text{Ag}$ as neutron induced nuclides.

The following conclusions must be outlined :

1. — In the Black Sea water at 200 m depth (Station III), no.
2. — At the Station VII have been detected only neutron induced nuclides, while fission products were lack.
3. — ^{60}Co has been identified only at Station VII, (1.8 ± 0.3) pCi/l.

4. — The specific activity of ^{65}Zn , i.e. pCi $^{65}\text{Zn}/1 \mu\text{gZn}/1$, has values from 0.014 to 0.348 less than the level of ^{65}Zn alone in the surface sea water. The specific activity of radiosilver varies from 0.46 to 1.22, much lower under the permissible limit in water. In the bottom sediments of 200 m depth has been found $(6.2 \pm 1.2)\text{pCi}^{137}\text{Cs}/\text{g}$ dry weight, and 2.1 mg $\text{H}_2\text{S}/1$ dissolved in sea water.

References

- [1] *International Atomic Energy Agency*, 1970. VI. Analytical methods for individual radionuclides and elements: Strontium, Caesium, Cerium, Cobalt, Zinc and other radionuclides and their stable counterparts, in Reference methods for marine radioactivity studies. *Technical Report Series*, **118**, IAEA-Vienna, 284 pp.
- [2] PRESTON (A.), DUTTON (J.W.R.) & HARVAY (B.R.), 1968. — Detection, estimation and significance of silver-110 m in oysters in the Irish sea and the Blackwater Estuary. *Nature*, **218**, pp. 689-690.