

Aromatic hydrocarbons contamination and characterization of sediments from larger seaports on East Adriatic

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Aromatic hydrocarbons enter the environment via a wide range of activities: accidental and normal operation from ships, coastal drilling and production operations, refinery and other industrial effluent, natural seeps, municipal effluents and storm sewer runoff and atmospheric transport of combustion products of various fossil fuel compounds (FARRINGTON et al., 1983).

Conventional fluorescence spectroscopy is a useful technique for analysis of aromatic hydrocarbons in marine environment. However, an improvement in resolution of the spectra may be made by varying the excitation wavelength maintained 20-30 nm less than the emission wavelength (LLOYD, 1971). He has also been demonstrated that the wavelength of maximum emission is a function of number of rings in a molecule.

Surface sediments (top 5 cm) were collected with gravity corer from 6 stations at a mouth of larger seaports on east Adriatic (Zadar, Šibenik, Split, Kardeljevo, Dubrovnik and referent station Vis) during July 1988. The fluorescence intensities of hexane extracts were measured in one cm quartz cells using a Perkin-Elmer 3000 fluorimeter.

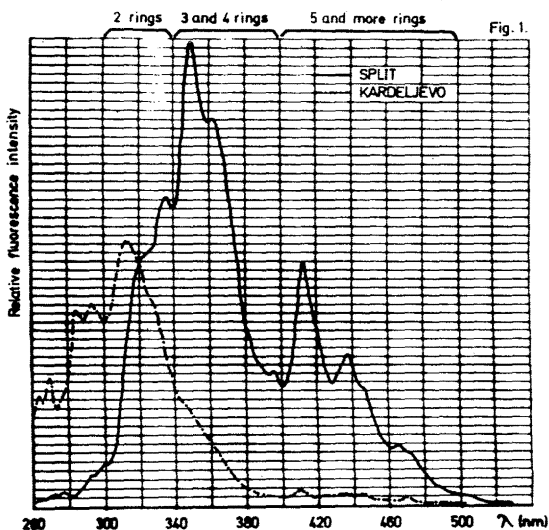
The results of various types of aromatic compounds expressed as a ratio between each aromatic group and total aromatics obtained with synchronous technique and the content of aromatic compounds analysed with fixed excitation wavelength technique are given in Table 1.

Table 1. The relative abundance of each group of aromatic hydrocarbons presented in surface sediments obtained from synchronous excitation emission spectra and total aromatic content calculated from fixed excitation technique.

Stations	2 rings aromatics	3 and 4 rings aromatics	5 and more rings aromatics	Total aromatic contents*
Zadar	0.38	0.42	0.20	4.50
Šibenik	0.25	0.41	0.34	60.10
Split	0.25	0.48	0.27	28.99
Kardeljevo	0.71	0.23	0.06	1.44
Dubrovnik	0.24	0.42	0.34	20.26
Vis	0.60	0.20	0.20	0.48

* μg chrysene equivalents/g dry weight of sediments

Examples of the types of relative abundance of aromatics are given in Fig. 1.



According to the results obtained with this investigation it was established that the ratio of various types of aromatic compounds in sediments from a larger seaports of eastern Adriatic coast are of mixed origin of petroleum sources and pyrogenic inputs (fossil fuel combustion).

The synchronous spectra of all samples (except from seaport Kardeljevo and locality Vis) have high content of three and four rings compounds probably as consequence of larger entering the bunker oil in these highly industrialised areas.

In seaports in which are determined the elevated contents of total aromatic hydrocarbons (Šibenik, Split, Dubrovnik) sediment is polluted also with larger amount of pyrogenic fossil fuel compounds.

It seems that light fuel oil discharged to seaport area of Kardeljevo is predominant aromatic compounds.

FARRINGTON, J.W., E.D. GOLDBERG, R.W. RISEBROUGH, J.H. MARTIN and V.T. BOWEN, 1983. Environ. Sci. Technol., 17 (8): 490-496.

LLOYD, J.B.F., 1971. J. Forens. Sci. Soc., 11: 83-94.