

Because of simplicity as well as sensitivity of the UV-spectrofluorometry, it is commonly used with great success in the detection and determination of petrogenic polyaromatic hydrocarbons (PAH), (AWAD, 1989; HEROS, 1972; GREFFARD and MEURY, 1967). These compounds are of great value in properly the human environment, especially since many of them are proved to be carcinogen. From methodological point of view, although the usage of UV-spectrofluorometry is fairly sensitive, its specificity for the determination of any particular PAH compound in a mixture is poor (SAWICKI *et al.*, 1960). In fact, the method is based simply on the fact that any PAH in a mixture has sharp characteristic absorption peaks which (in the case of prominent peaks) usually protrude above the background absorption of the mixture. The estimation of concentration of a Particular PAH in the mixture is usually accomplished by comparison of the intensity of the prominent fluorescence peak produced by the application of an excitation at certain wave length with that produced from a reference solution containing known amount of the measured compound. This is usually followed without considering the presence of other PAH compounds in the mixture having fluorescence bands close to that of the compound being analyzed which interferes with the accuracy of the technique.

The present article shows to what extent the presence of two polyaromatic hydrocarbons compounds (benzo-8,9-fluoranthene (BKF) and perylene (P)) is affecting the accuracy of UV-spectrofluorometry in the detection of the most potent carcinogen compound benzo-3,4-pyrene (BaP) (SONTAGE, 1981; HEROS, 1972). However, an analytical method depending on the complete activation and fluorescence spectral analysis is proposed. By following this method, detection and estimation of specific compound without interference of others could be successfully carried out.

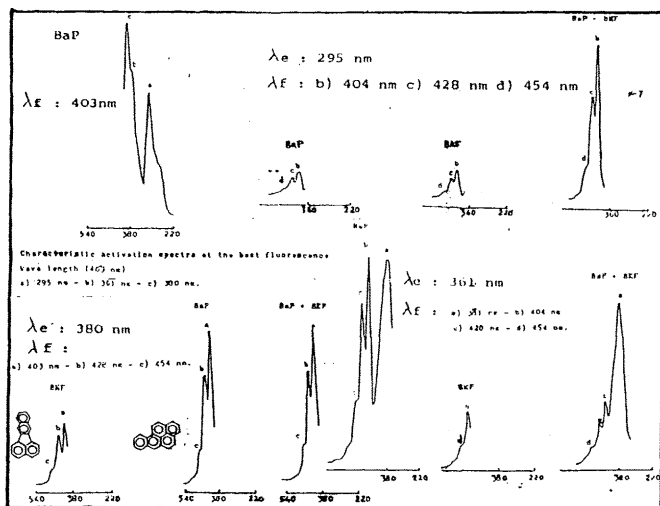
Practically, two experiments have been established. The first is devoted for examining the interference effect of the presence of BKF on the measurement of BaP using n-pentane as solvent, while the second for the detection and measurement of both BaP and perylene in mixture without interference of their measured fluorescence spectra using sulfuric acid as solvent.

The used instrument for the determination of activation and fluorescence spectra is Baird fluoripoint spectrofluorometer, Ratiometric RC 200.

The proposed method is simply based on complete analysis of BaP activation spectra in order to select one of them (even if it is not the best one producing the most intense fluorescence band) at which certain PAH compound could be determined without interference of other chemicals in a mixture.

For the determination of BaP in n-pentane solution containing BKF, it was found that BaP could be estimated at 381 nm fluorescence wave length through activation at 295 nm without interference of BKF. Throughout the same methodology, BaP could be determined without interference of perylene by applying a 283 nm activation wave length for their solutions in sulfuric acid. However, the two compounds could be detected separately at fluorescence bands corresponding to 385 and 396 nm respectively. The figure below include.

The figure below includes an example for the followed methodology in the case of detection of BaP and BKF without interference when they are present together.



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The purpose of this study was to establish the background of petroleum hydrocarbons dispersed and dissolved in the surface waters of the Eastern Aegean Sea and Turkish shoreline. The average dissolved and dispersed petroleum hydrocarbons concentrations for the limited numbers of surface waters samples from the Aegean Sea were reported as 0.67 µg/l by SAKARYA (1985). Samples were collected during 1986-1989 for four seasons in the Aegean Sea. IOC/UNEP (1984) manual for monitoring oil and dissolved/dispersed petroleum hydrocarbons in marine waters was used for sampling, extraction and the overall analytical procedure.

Samples were taken at depth of 1 m using a sampler and kept in a dark and cool place on board of the ship, until delivered to the shore laboratory for analysis. The Sea water samples were extracted twice in a separatory funnel with 2x25 ml CCl₄. The combined extracts were dried with the addition of anhydrous Na₂SO₄ in rotary evaporator. Care was taken to remove all of the carbon tetrachloride (CCl₄) which quenches fluorescence. The residue was dissolved in 5 ml of aromatic free n-hexane and fluorescence measured on a Turner, Model 430 Fluorescence Spectrometer, with 1 cm quartz cell. The intensity of fluorescence was measured at 360 nm (excitation at 310 nm). Chrysenes was chosen as an intercomparison chemical for intercalibration of the procedure. The working standards were in the same range as the sea water samples. Blanks and chrysenes standards were prepared using the same procedure as that for the samples.

Study area and positions of the sampling stations are given in Fig.1. The coastal and open surface waters showed a concentration range of 0.09 - 25.5 µg/l but most of the results are within 0.09-1.92 µg/l range only a few samples had above 10 µg/l values. Frequency distribution of petroleum hydrocarbons concentrations in samples is given in Fig.2. It was observed during these cruises that the relatively large quantities of dissolved oils were found at the Aegean entrance region of Dardanelles in the northern Aegean Sea. In this area, debalasting, release of wash waters and bilges from tankers and other ships were permitted in the past and has probably still been practiced by many boats today. Dardanelles strait is one of the main navigation route for the Black Sea.

The levels of dissolved dispersed petroleum hydrocarbons at near Aliaga Bay which encloses a large refinery and petrochemicals complex, are relatively high and fluctuate widely. Deliberate oil spill from ships and tankers in addition to the wastes coming from the oil refinery can be considered as the possible cause of the high oil concentrations in the waters of Aliaga Bay.

Therefore, the Aegean waters may be considered unpolluted by dissolved and dispersed petroleum hydrocarbons when compared with the other seas of the world. The petroleum hydrocarbons concentration levels of all obtained results from the investigated area can be considered in the safely limit with respect to National Academy Report (1975).

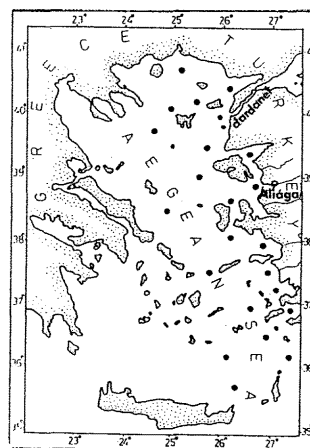


Fig:1 Sampling stations

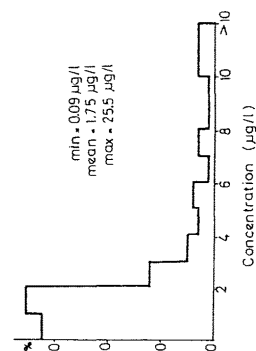


Fig:2 Frequency distribution of DDPH

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