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DUANGDUEAN HINSIN: DETERMINATION OF POLYCYCLIC AROMATIC
HYDROCARBONS IN WATER SAMPLES BY DERIVATIVE SYNCHRONOUS
SPECTROFLUORIMETRY. THESIS ADVISORS: JUWADEE SHIOWATANA, Ph.D.,
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A derivative synchronous spectrofluorimetric method was developed for determination of six polycyclic aromatic hydrocarbons (PAHs) designated as indicators of water quality, namely fluoranthene (flu), benzo[b]fluoranthene (bbf), benzo[k]fluoranthene (bkf), benzo[a]pyrene (bap), benzo[ghi]perylene (bgp) and indeno[1,2,3-cd]pyrene (ind). Derivative synchronous method can solve the problem of overlapping of the broad-band fluorescence spectra of the ternary mixtures of bgp, bap and bkf. Scanning with wavelength interval ($\Delta\lambda$) 110 nm and measurement at 300.5, 304.0 and 314.0 nm for the above PAHs, respectively was found to be optimal for simultaneous determination with minimal interference effect. Applicability of this derivative synchronous method in more complicated mixtures appeared unsuccessful. Multicomponent calibration method was employed for mathematical manipulation of fluorescence data to determine the six individual PAHs in their mixtures. Simultaneous determination of flu, bap, bbf and bkf in the presence of bgp and ind was achieved by second-derivative synchronous spectrofluorimetric measurement at $\Delta\lambda$ of 155 nm. Wavelengths for quantitative determination were 288.0, 297.0, 302.0 and 308.0 nm. The method detection limits of the above compounds were 0.15, 0.07, 0.10 and 0.03 ng ml⁻¹, respectively. Preconcentration was required for the analysis of the water samples with low levels of PAHs. Solid phase extraction (SPE) was used, to obtain 160-fold enrichment. The analytical results obtained by derivative synchronous spectrofluorimetry agree well with the results obtained by HPLC, which were used as a comparative method.