**Enhanced sensitivity and selectivity in the detection of polycyclic aromatic hydrocarbons using sequential simplex optimization, the addition of an organic modifier and wavelength programming**

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**Abstract:** Optimized separation of a mixture of 16 priority pollutant polycyclic aromatic hydrocarbons (PAHs) by high performance liquid chromatography (HPLC) using the sequential simplex optimization method was accomplished by varying the starting and ending compositions of acetonitrile and water, linear gradient time, mobile phase flow rate, column temperature and holding time of the final mobile phase composition. Focusing on the two sets of difficult-to-separate pairs (acenaphthene-fluorene and benzo[g,h,i]perylene-indeno[1,2,3-c,d]pyrene), analysis time was reduced by about ten percent through the use of an organic modifier (isopropanol or methanol), under both optimum and near-optimum conditions, while maintaining good separation of the remaining PAHs. High sensitivity for all of the 16 PAHs was achieved by wavelength programming during elution using five wavelengths (224, 235, 254 270 and 296 nm), depending upon the molar absorptivities of the individual compounds. Detection limits (DLs) ranging from 0.002 (benzo[a]pyrene) to 0.140 mug ml(-1) (acenaphthene) were achieved for this set of 16 standard compounds. 

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