

## عنوان مقاله:

Polycyclic Aromatic Hydrocarbons from Bottled Water: A New Automated Solid Phase Extraction Method and Simulation of Cancer Risk

## محل انتشار:

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## نویسندگان:

Fatemeh Mahdavi Doost - *Department of Environmental Health Engineering, Health Faculty, Qazvin University of Medical Sciences, Qazvin, Iran*

Mohammad Mehdi Emamjome - *Department of Environmental Health Engineering, Health Faculty, Qazvin University of Medical Sciences, Qazvin, Iran*

Hamze Ali Jamali - *Department of Environmental Health Engineering, Health Faculty, Qazvin University of Medical Sciences, Qazvin, Iran*

Hamid Karyab - *Department of Environmental Health Engineering, Health Faculty, Qazvin University of Medical Sciences, Qazvin, Iran- Research Center for Social Determinants of Health, Qazvin University of Medical Sciences, Qazvin, Iran*

## خلاصه مقاله:

Considering the adverse effects of polycyclic aromatic hydrocarbons (PAHs) on human health and the complexity of their detection in water resources, this study was developed to assess the performance of a new automated device for the identification of PAHs in water based on the solid-phase extraction and to simulate the cancer risk of 16 priority PAHs by Monte Carlo technique. All operational modes of extraction were automatically performed using the proprietary software program. Three spiked aliquots of PAHs including 100, 500, and 1000 ng/L were used to evaluate the performance of the automated-solid phase extraction (SPE) apparatus. The time of extraction in the automatic-SPE apparatus was  $50 \pm 4$  minutes for simultaneous extraction of 4 water samples, which was four times faster than that of manual-SPE apparatus. The mean recoveries of PAHs were  $89.22 \pm 4.94$ ,  $91.70 \pm 4.45$ , and  $94.61 \pm 6.28\%$  in spiked samples, with a mean of  $91.84 \pm 5.22\%$ . Except for naphthalene, all obtained recoveries were in an acceptable range (85-115%). The results of Monte Carlo simulation showed that the cancer risk attributable to eight detected PAHs including naphthalene, fluorene, phenanthrene (Phe), benzoanthracene, chrysene, benzo(k) fluoranthene, indeno(cd)pyrene, and dibenzo(a,h)anthracene ranged from  $0.05E-6$  to  $0.11E-6$ , with the cancer risk of  $0.012E-6$  having the highest probability ( $P = 0.82$ ). Additionally, this simulation showed that 99% of the probability density of cancer risk was located within the range lower than  $0.05E-6$ . Our results showed that the novel automated-SPE apparatus could be utilized for the extraction of PAHs from water resources with a good recovery (85%-115%), high operational speed, and potential for separation of solvents from the air in the drying step. Therefore, this device can be used for the extraction of trace PAHs and similar organic compounds from water resources.

## کلمات کلیدی:

Drinking water, Polycyclic aromatic hydrocarbons, Automated solid-phase extraction, Risk, Monte Carlo method

