

## Trends And Source Identification Of Polycyclic Aromatic Hydrocarbons (Pahs) In Five-size Particulate Matter In The Nakhon Ratchasima Province, Thailand

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**Abstract :** In this work, perform an analysis to identify the source of PAHs in particulate matter (PM). The five sizes are 0.1, 0.5, 1, 2.5, and 10 microns from Nakhon Ratchasima province, Thailand. Nakhon Ratchasima is a province in the northeastern part of Thailand. It has an area of 20,493 square kilometers and a forest area of 2,297,735 rai, making it the second largest area in the country. The major economies of Nakhon Ratchasima Province have an important structure, including the industrial sector. The agricultural sector and wholesale and retail trade accounted for 22.46 percent, 19.82 percent, and 14.91 percent, respectively. This study, we collected particulates using the Nano-sampler II sampling tool for a month. PM samples (n = 20) were collected in Tambon Suranari (14°52'05.6"N, 102°00'31.8"E) is a sub-district located in the Mueang district of Nakhon Ratchasima province. It is an important area consisting of community sites, educational institutions, universities, hospitals, religious places, and industrial areas. The samples collected from November 1, 2024 to November 30, 2024. Then, the PM samples were wrapped with aluminium foil and stored at -4 °C until the analysis. The PAHs were chemically extracted for eight hours using a Soxhlet extractor and internal standards (deuterated-fluorene (d10-Fl): phenanthrene, anthracene, fluoranthene, pyrene, 11 H-benzo[a]fluorene, 11 H-benzo[b]fluorene, chrysene; deuterated-perylene (d12-Per): benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a] pyrene, benzo[e]pyrene, indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene, and benzo[g,h,i]perylene using DCM as a solvent, and then analyzed 15 PAHs from the PM using a gas chromatograph-mass spectrometer (Shimadzu GCMS-QP, 2010 Ultra) in the selective ion monitoring mode. The sources of PAHs in Nakhon Ratchasima particulate matter were determined using a combination of multivariate descriptive statistics and diagnostic binary ratios of PAHs. The source of PAHs in particulate matter was identified using five diagnostic binary ratios of PAH isomer pairs: An/(An + Phe), Fluo/(Fluo + Pyr), B[a]A/(B[a]A + Chry), Ind/(Ind + B[g,h,i]P), and B[a]P/B[g,h,i]P. According to the diagnostic ratio, the majority of the PAHs found in the particulate matter samples came from pyrogenic sources, which include incomplete burning of biomass and petroleum. Additionally, multivariate descriptive statistics (principal components analysis (PCA)) were used to identify the source of 15 PAHs in the Nakhon Ratchasima sample of particulate matter. The results of the PCA identification of aromatic polycyclic hydrocarbons in PM show that incomplete combustion from the use of fuel is also a major source of aromatic polycyclic hydrocarbons in Nakhon Ratchasima province. In the future, we anticipate that the study will help the environmental planning management of Thailand's Nakhon Ratchasima province and many other nations.

**Keywords :** polycyclic aromatic hydrocarbons (PAHs), particulate matter (PM), diagnostic binary ratio, source apportionment

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