

ABSTRAK

PROFIL *POLYCYCLIC AROMATIC HYDROCARBONS* (PAHs) PADA PERAIRAN DAN SEDIMEN HUTAN MANGROVE KOTA BANDAR LAMPUNG

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Ekosistem mangrove memiliki peran sangat penting, namun saat ini luasnya terus mengalami pengurangan akibat pembangunan. Selain memberikan manfaat bagi manusia, proses pembangunan di sekitar area hutan mangrove juga akan menimbulkan dampak negatif, salah satunya adalah potensi limbah yang mengandung senyawa berbahaya seperti PAHs. PAHs merupakan zat kontaminan yang terdiri dari beberapa rantai siklik aromatik, bersifat hidrofobik, tersebar luas, stabil di lingkungan, dan sebagai polutan utama karena sifatnya yang beracun, mutagenik, dan karsinogenik. Penelitian ini bertujuan untuk menentukan nilai parameter validasi metode SPME-GCMS, mendapatkan data jenis dan jumlah PAHs serta mengetahui sumber kontaminan PAHs pada perairan dan sedimen yang terdapat di hutan mangrove Kota Bandar Lampung menggunakan metode *diagnostic ratio*.

Validasi metode SPME-GCMS menunjukkan metode ini mempunyai keberulangan baik (nilai % *RPD phenanthrene* = 9,42 %, *anthracene* = 3,22 %, *fluoranthene* = 9,13 %, *pyrene* = 1,89 %, *benzo(a)anthracene* = 4,97 %, dan *chrysene* = 16,49 %), akurasi baik (nilai % *recovery phenanthrene* = 80,62 %, *anthracene* = 81,75 %, *fluoranthene* = 85,98 %, *pyrene* = 95,21 %, *benzo(a)anthracene* = 92,07 %, dan *chrysene* = 81,79 %), dan teruji linearitasnya (nilai koefisien korelasi (*r*) *phenanthrene* = 0,999; *anthracene* = 0,995; *fluoranthene* = 0,984; *pyrene* = 0,996; *benzo(a)anthracene* = 0,992; *chrysene* = 0,999; *benzo(a)pyrene* = 1; *benzo(e)pyrene* = 0,998; dan *perylene* = 0,999). Nilai LoD/LoQ untuk senyawa *phenanthrene* = 5,859 ppb/19,529 ppb; *anthracene* = 12,457 ppb/41,522 ppb; *fluoranthene* = 23,479 ppb/78,265 ppb; *pyrene* = 11,642 ppb/38,805 ppb; *benzo(a)anthracene* = 16,843 ppb/56,142 ppb; *chrysene* = 5,961 ppb/19,869 ppb; *benzo(a)pyrene* = 0,5 ppb/1,658 ppb, *benzo(e)pyrene* = 8,816 ppb/29,385 ppb, dan *perylene* = 2,822 ppb/9,407 ppb. Senyawa PAHs yang terdeteksi adalah: *naphthalene*, *phenanthrene*, *anthracene*, *fluoranthene*, *pyrene*, *benzo(a)anthracene*, dan *chrysene*. Kadar PAHs total pada sampel air berkisar dari 11,377-231,768 ppb dan hasil *screening* awal sampel sedimen berkisar dari 534,677-1.220,2 ppm. Penentuan sumber kontaminan PAHs pada perairan dan sedimen menggunakan metode *diagnostic ratio* menghasilkan data bahwa sumber dominan pencemaran PAHs berasal dari campuran sumber petrogenik (produk minyak) dan sumber pirolisis (pembakaran bahan organik dan pembakaran berbahan bakar minyak).

Kata kunci: PAHs, SPME, GC-MS, validasi metode.

ABSTRACT

PROFILE *POLYCYCLIC AROMATIC HYDROCARBONS* (PAHs) IN WATER AND SEDIMENT OF MANGROVE FOREST BANDAR LAMPUNG

By

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Mangrove ecosystem has a very important responsibility, however the area of mangrove ecosystem today is decreasing due to the development. Besides providing benefits to people, development process around the mangrove forest area will also lead to negative effects, one of which is the potential of waste containing hazardous compounds such as PAHs. PAHs are contaminants that consists of several aromatic cyclic chains, hydrophobic, widespread, stable in the environment, and as a foremost pollutant because it is toxic, mutagenic, and carcinogenic. This study aims to determine the value of the parameter validation SPME-GCMS method, getting the type and amount data of PAHs and know the source of PAHs contaminants in waters and sediments contained in the mangrove forests of Bandar Lampung using diagnostic method ratio.

SPME-GCMS method validation show this method has a good precision (% RPD value of phenanthrene = 9.42%, anthracene = 3.22%, fluoranthene = 9.13% = 1.89% pyrene, benzo(a)anthracene = 4.97%, and chrysene = 16.49%), good accuracy (% recovery value of phenanthrene = 80.62%, anthracene = 81.75%, fluoranthene = 85.98% = 95.21% pyrene, benzo(a)anthracene = 92.07%, and chrysene = 81.79%), and tested linearity (the value of the correlation coefficient (r) of phenanthrene = 0.999, anthracene = 0.995, fluoranthene = 0.984, pyrene = 0.996, benzo(a)anthracene = 0.992, chrysene = 0.999, benzo(a)pyrene = 1, benzo(e)pyrene = 0.998, and perylene = 0.999). Value LOD/LOQ for phenanthrene compound = 5.859 ppb/19.529 ppb, anthracene = 12.457 ppb/41.522 ppb, fluoranthene = 23.479 ppb/78.265 ppb, pyrene = 11.642 ppb/38.805 ppb, benzo(a)anthracene = 16.843 ppb/56.142 ppb, chrysene = 5.961 ppb/19.869 ppb, benzo(a)pyrene = 0.5 ppb/1.658 ppb, benzo(e)pyrene = 8.816 ppb/29.385 ppb, and perylene = 2.822 ppb/9.407 ppb. Compounds detected PAHs

are: naphthalene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, and chrysene. Levels of total PAHs in water samples ranged from 11.377 ppb to 231.768 ppb and the results of the initial screening sediment samples ranging from 534.677 ppm to 1,220.2 ppm. Pinpointing the source of PAHs contaminants in waters and sediments using ratio diagnostic methods produce data that the dominant source of PAHs pollution comes from a mix of sources petrogenik (oil products) and a source of pyrolysis (burning of organic material and oil-fueled combustion).

Key words: PAHs, SPME, GC-MS, method validation.