Application Note

Date: 1999.6.28 **No. 820010H-E**

Simultaneous detection of PAHs and Nitroarenes with increased selectivity and sensitivity

In urban areas and near to main roads, increasing incidence of lung cancer is believed to be due to the carcinogenic and mutagenic properties of the polycyclic aromatic hydrocarbons (PAHs) and their nitrogen compounds found in the air. The principal origin of these chemicals is believed to be the particles emitted from diesel engine exhaust fumes. In this report, some examples were shown of high sensitivity and selectivity detection of nitroarene in a system for simultaneous analysis of nitroarene and PAH employing online pre-processing and reduction. Fig. 1~3 shows examples measurements of 1-nitroarene and dinitropirene (3 components) and PAHs (17 components) in standard samples and the extracts from diesel engine exhaust paticulates.

STD

1. 1,6-DNP	12. Pyrene
2. 1,8-DNP	13. Benzo(a)Anthracene
3. 1,3-DNP	14. Chrysene
4. 1-NP	15. Benzo(e) phrene
5. Naphthalene	16. Benzo(b) fluoranthene
6. Acenaphthylene	17. Benzo(k) fluoranthene
7. Acenaphthene	18. Benzo(a) pyrene
8. Fluorene	19. Dibenzo(a, h) anthracene
9. Phenanthrene	20. Benzo(g, h, l) perylene
10. Anthracene	21. Indeno(1, 2, 3-c. d) pyrene
11. Fluoranthene	

Conditions:

Column:
NPpak-P ,pretreatment (4.6mm I.D. x 10mmL)
NPpak-R ,reduction(4.6mm I.D. x 10mmL)
NPpak ,separation (4.6mm I.D. x 250mmL)
NPpak-G , separation(4.6mm I.D. x 35mmL)

Eluent:
A: 0.1% DEA in MeOH/H2O(50/50)
B: MeOH

Time(min)	0	3.5	40.0	50.0	50.1
A(%)	100	100	0	0	100
B(%)	0	0	100	100	0

1cycle 65min

Keywords: 1. Nitroarenes, PAHs, 2. STD mixture, Diesel engine exhaust, 3. NPpak, 4. FL, UV

FL-1 time program:

Time (min)	Ex(nm)	Em(nm)	Gain
0.0	375	460	x100
18.0	365	436	x100
25.0	260	420	x100
30.9	250	420	x100
32.9	286	433	x100
34.1	266	402	x100
40.5	294	430	x100
47.6	294	482	x100

FL-2 Wavelength: Ex 280nm, Em 330nm, Gain x100

UV/Vis time program:

Time(min)	WL(nm)
0.0	270
5.8	330

Flow rate: 1.0mL/min

Column temperature: pretreatmen 40 degree celsius
reduction 80 degree celsius
separation 40 degree celsius

Injection volume: 10µL

Sample: STD mixture, Diesel engine exhaust

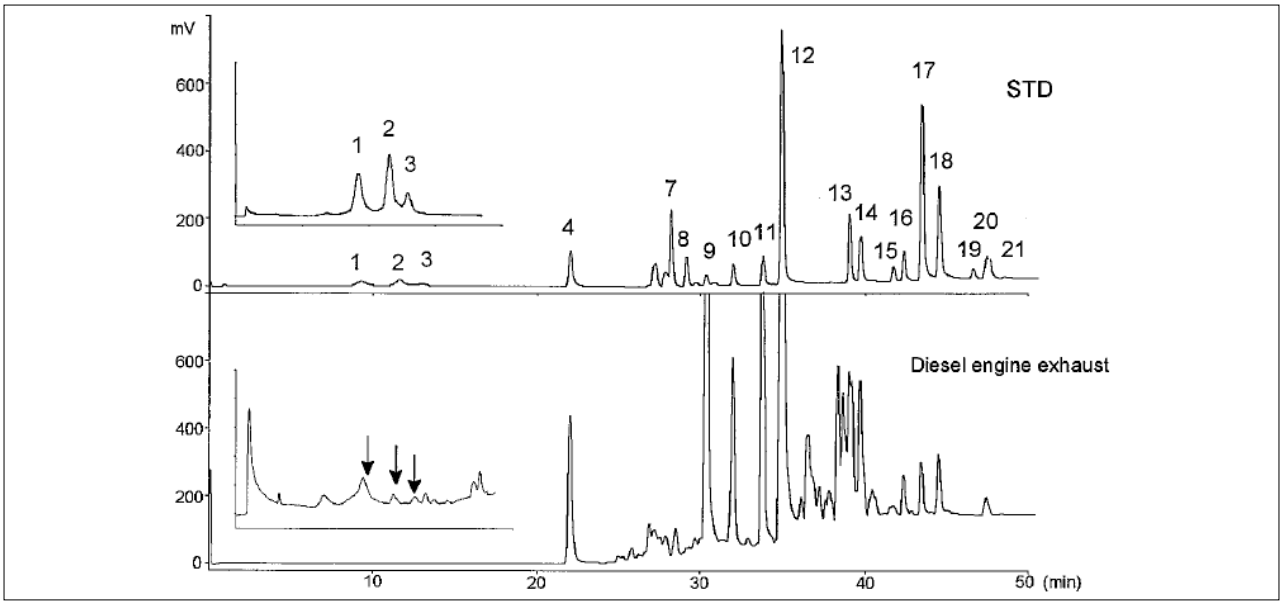

Fig. 1 Chromatograms (FL-1) of standard sample and extract from diesel engine exhaust particulates

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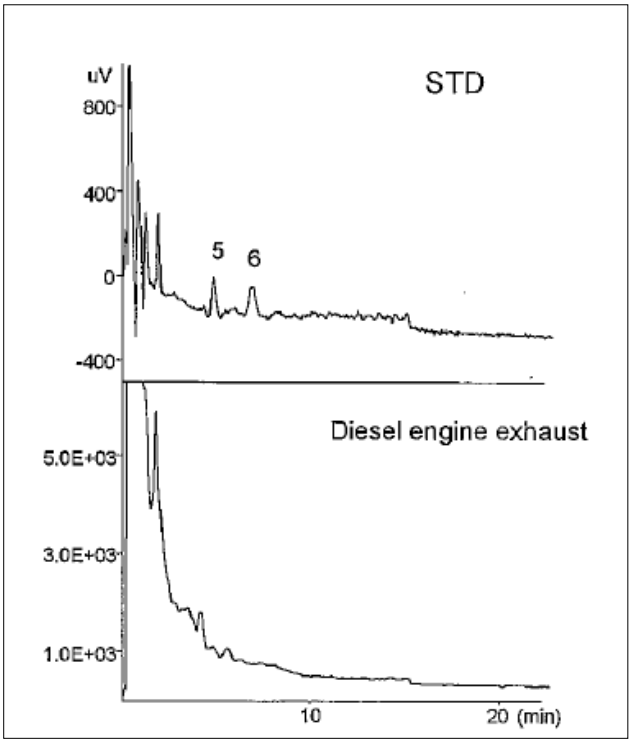

Fig. 2 Chromatograms (UV/VIS) of standard sample and extract from diesel engine exhaust particulates

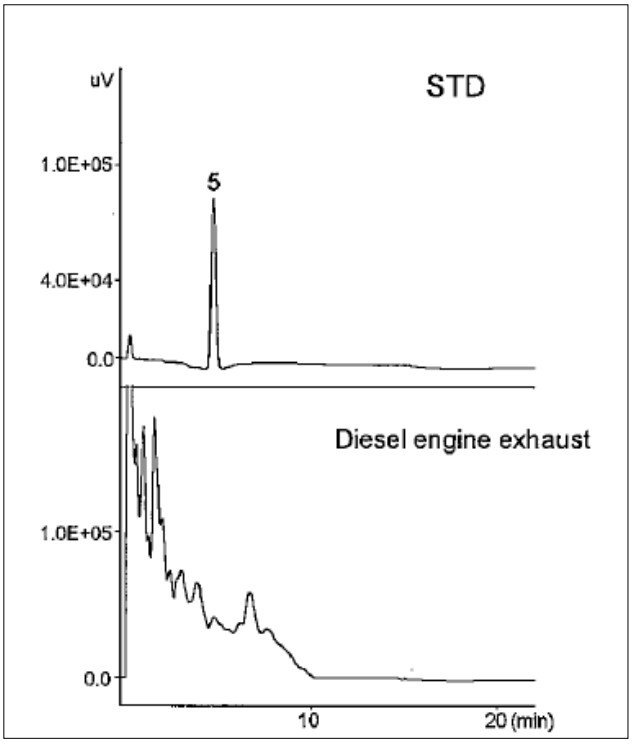

Fig. 3 Chromatograms (FL-2) of standard sample and extract from diesel engine exhaust particulates

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