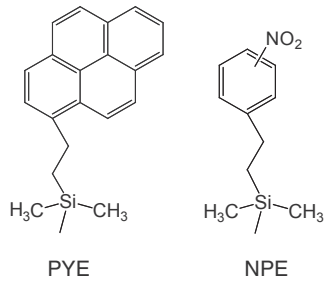
HPLC Column for Structual Isomers

COSMOSIL PYE
COSMOSIL NPE

	COSMOSIL PYE	COSMOSIL NPE
Silica Gel	High Purity Porous Spherical Silica	
Average Particle Size	5 µm	
Average Pore Size	approx. 120 Å	
Stationary Phase	2-(1-Pyrenyl)ethyl Group	Nitrophenylethyl Group
Main Interaction	Hydrophobic Interaction π-π Interaction Charge Transfer Interaction Stereoselectivity	Hydrophobic Interaction π-π Interaction Dipole-Dipole Interaction
Carbon Content	approx. 18%	approx. 9%



PYE NPE

COSMOSIL PYE (Pyrenylethyl group bonded) and COSMOSIL NPE (Nitrophenylethyl group bonded) column show unique retention characteristics based on multiple separation modes such as hydrophobic, charge transfer and π-π interactions. These columns are recommended for the separation of structural isomers.

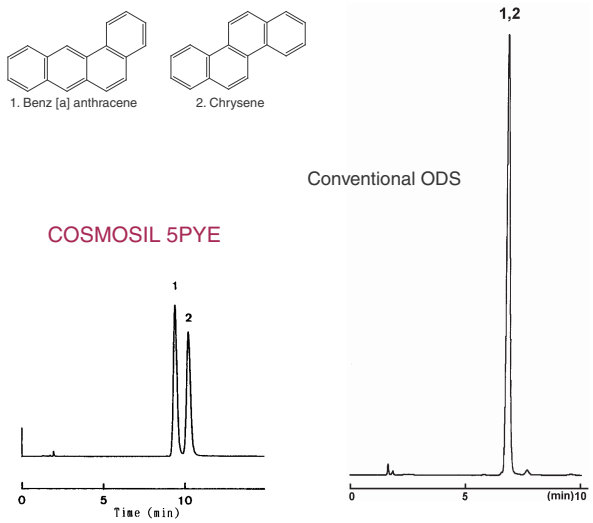
COSMOSIL PYE

- *Pyrenylethyl group bonded stationary phase*
- *Separation with high molecular shape selectivity or π-π interactions*
- *Excellent separation for structural isomers*

COSMOSIL PYE column is a reversed phase column with 2-(1-Pyrenyl) ethyl groups bonded silica packing material. This column utilizes π-π interactions originating from the planar pyrene ring structure to separate structural isomers.

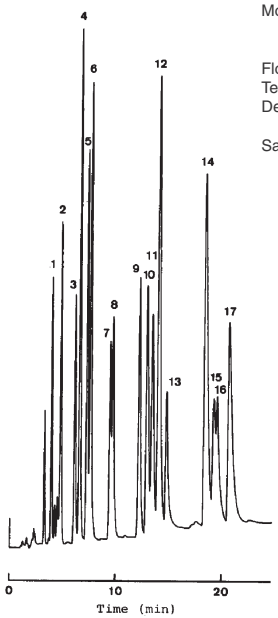
Separation of PAHs

Due to the planar pyrene ring structure and strong π-π interactions, COSMOSIL PYE achieves excellent separation of aromatic isomers.



Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	Methanol : Water = 90 : 10
Flow Rate	1.0 ml/min
Temperature	30°C
Detection	UV 254 nm

Sample 1. Benz [a] Anthracene
2. Chrysene



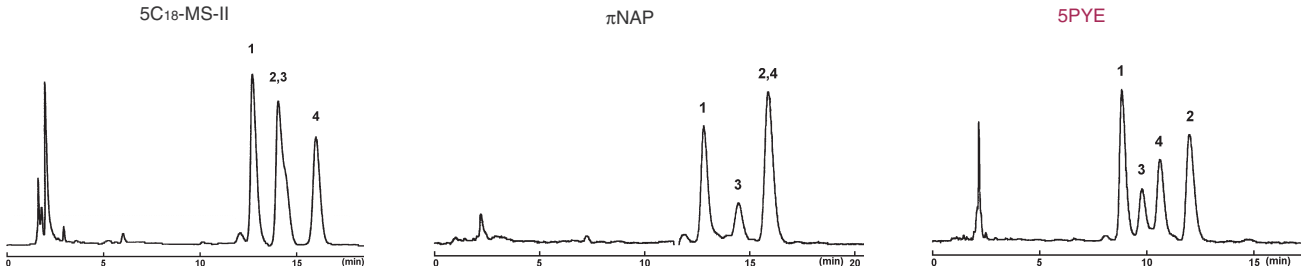
Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	A: Water, B: Methanol B 80% → B 100% 20 min. Linear Gradient
Flow Rate	1.0 ml/min
Temperature	30°C
Detection	UV 254 nm

Sample
1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Flourene
5. Phenathrene
6. Acnthracene
7. Fluoranthene
8. Pyrene
9. *2, 3*-Benzofluorene
10. Benz [a] Anthracene
11. Chrysene
12. Triphenylene
13. Naphthacene
14. Benzo[a] Pyrene
15. Perylene
16. Dibenz [a,c] Anthracene
17. Dibenz [a,h] Anthracene

COSMOSIL PYE (continued)

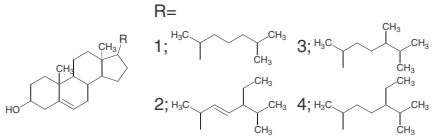
Application Data

• Separation of Sterols

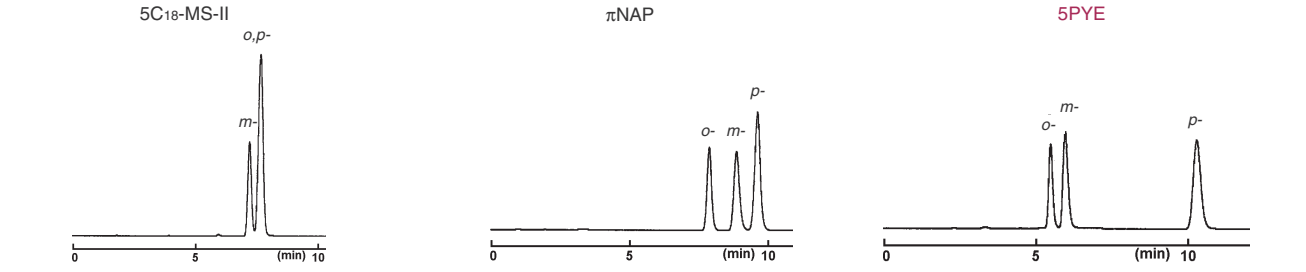


Column Size	4.6 mm I.D. x 150 mm	
Mobile Phase	5C18-MS-II	Methanol : H_2O = 98 : 2
	πNAP	Methanol : H_2O = 90 : 10
	5PYE	Methanol : H_2O = 95 : 5
Flow Rate	1.0 ml/min	
Temperature	30℃	
Detection	UV 210 nm	

Sample
1. Cholesterol (5.6 µg)
2. Stigmasterol (5.9 µg)
3. Campesterol
4. Sitosterol

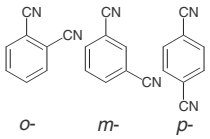


• Separation of Phthalonitriles

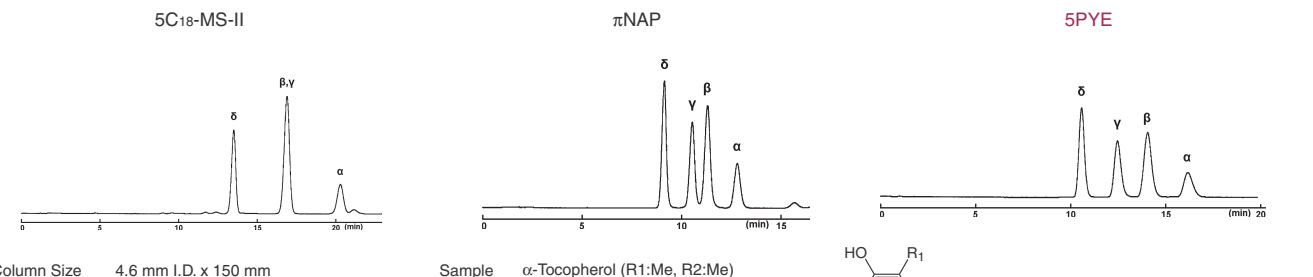


Column Size	4.6 mm I.D. x 150 mm	
Mobile Phase	5C18-MS-II	Methanol : H_2O = 30: 70
	πNAP	Methanol : H_2O = 50 : 50
	5PYE	Methanol : H_2O = 80 : 20
Flow Rate	1.0 ml/min	
Temperature	30℃	
Detection	UV 254 nm	

Sample
o-; Phthalonitrile (0.3 µg)
m-; Isophthalonitrile (3.0 µg)
p-; Terephthalonitrile (0.15 µg)

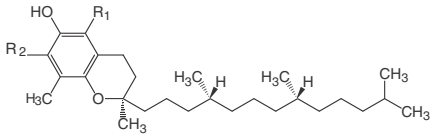


• Separation of Tocopherols

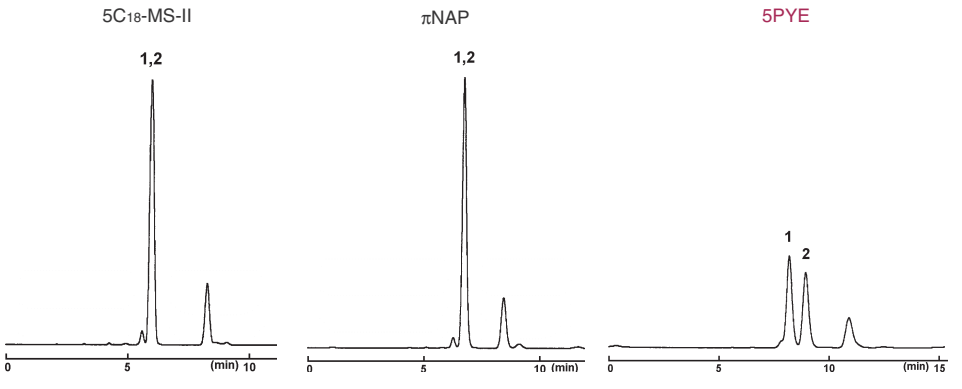


Column Size	4.6 mm I.D. x 150 mm	
Mobile Phase	5C18-MS-II	Methanol : H_2O = 95 : 5
	πNAP	Methanol : H_2O = 90 : 10
	5PYE	Methanol : H_2O = 90 : 10
Flow Rate	1.0 ml/min	
Temperature	30℃	
Detection	UV 295 nm	

Sample
α-Tocopherol (R1:Me, R2:Me)
β-Tocopherol (R1:Me, R2:H)
γ-Tocopherol (R1:H, R2:Me)
δ-Tocopherol (R1:H, R2:H)

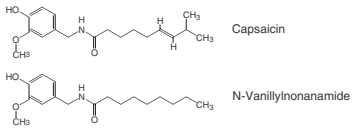


• Separation of Capsaicin



Column size	4.6 mm I.D. x 150 mm
Mobile phase	Methanol : Water = 70 : 30
Flow rate	1.0 ml/min
Temperature	30℃
Detection	UV 280 nm

Sample
1. Capsaicin (1.0 µg)
2. *N*-Vanillylnonanamide (0.5 µg)



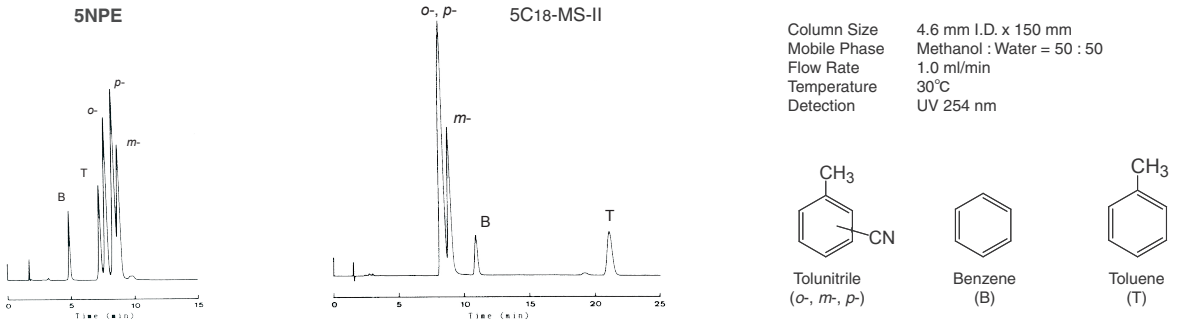
COSMOSIL NPE

COSMOSIL NPE column is a reversed phase column with Nitrophenylethyl groups bonded silica packing material. This column provides unique retention characteristics, slightly different from the COSMOSIL PYE column, utilizing both dipole-dipole and π-π interactions.

- *Nitrophenylethyl group bonded stationary phase*
- *Separation with dipole-dipole and π-π interactions*
- *Excellent separation for structural isomers*

Advantage of Dipole-Dipole Interactions

The chromatogram below illustrates the separation of *o-, m-, p*-tolunitrile. Since hydrophobic interaction is dominant in the separation by a ODS column, tolunitrile elutes first. In COSMOSIL NPE, tolunitrile elutes later. This suggests that COSMOSIL NPE utilizes the interaction between π-electron of the nitrophenyl group and CN- for retention in addition to hydrophobic interaction.

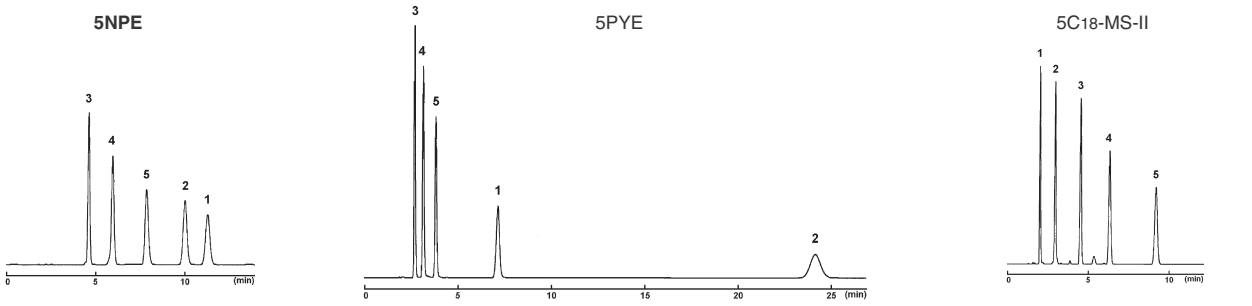


Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	Methanol : Water = 50 : 50
Flow Rate	1.0 ml/min
Temperature	30℃
Detection	UV 254 nm

Tolunitrile (*o-*, *m-*, *p-*) | Benzene (B) | Toluene (T)

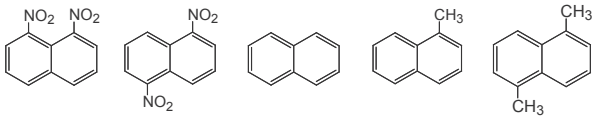
Application of Disubstituted Naphtalenes

COSMOSIL NPE strongly retains *1,8*-dinitronaphthalene because of the strong dipole formed by the two nitro groups positioned on the same side of naphthalene.



Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	PYE: Methanol : Water = 90 : 10
	NPE: Methanol : Water = 70 : 30
	ODS: Methanol : Water = 80 : 20
Flow Rate	1.0 ml/min
Temperature	30℃
Detection	UV 254 nm

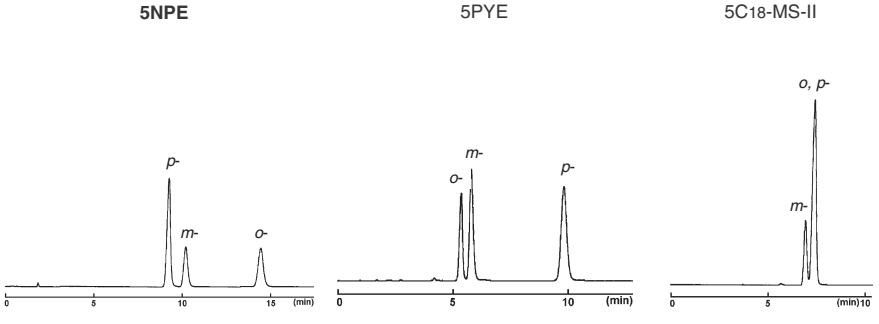
Sample
1. *1,8*-Dinitronaphtalene
2. *1,5*-Dinitronaphtalene
3. Naphtalene
4. *1*-Methylnaphtalene
5. *1,5*-Dimethylnaphtalene



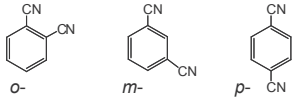
1 | 2 | 3 | 4 | 5

Effect of Dipole-Dipole Interaction

The ODS column cannot sharply separate the positional isomers like phthalonitriles. In contrast, COSMOSIL PYE and NPE can separate them very well by π-π interaction. Furthermore, COSMOSIL NPE strongly retains ortho compound which has a big dipole moment.



Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	NPE: Methanol : Water = 40 : 60
	PYE: Methanol : Water = 80 : 20
	ODS: Methanol : Water = 30 : 70
Flow Rate	1.0 ml/min
Temperature	30℃
Detection	UV 254 nm
Sample	1. *o*-Phthalonitrile (0.30 µg)
	2. *m*-Phthalonitrile (3.00 µg)
	3. *p*-Phthalonitrile (0.15 µg)

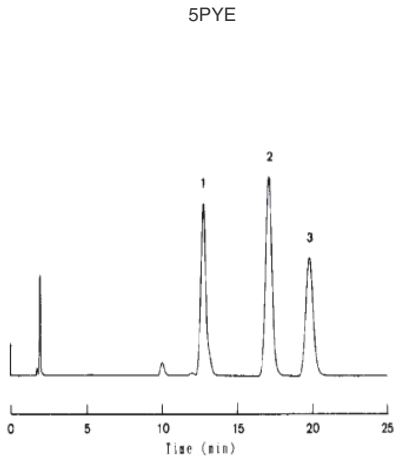


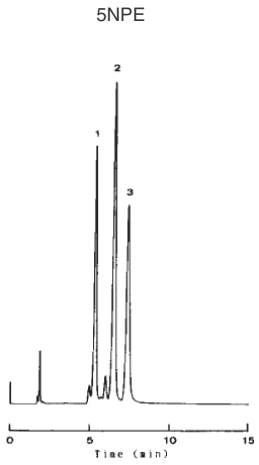
o- | *m-* | *p-*

COSMOSIL NPE (continued)

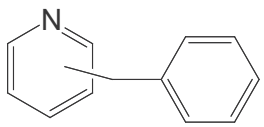
Application Data

• Positional Isomers like Benzylpyridines

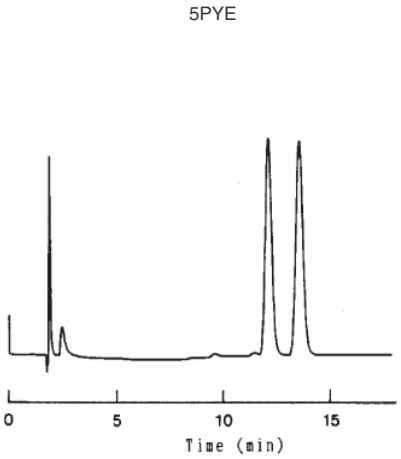


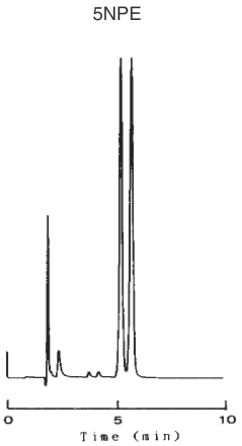


Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	Methanol : 20 mmol/l KH_2PO_4 = 60 : 40
Flow Rate	1.0 ml/min
Temperature	30°C
Detection	UV 254 nm
Sample	1. *2*-Benzylpyridine 2. *3*-Benzylpyridine 3. *4*-Benzylpyridine

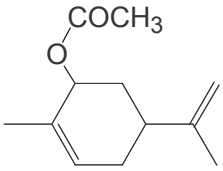


• Geometrical Isomers like Carvylacetates





Column Size	4.6 mm I.D. x 150 mm
Mobile Phase	70% Methanol
Flow Rate	1.0 ml/min
Temperature	30°C
Detection	UV 215 nm
Sample	1. Carvylacetate (*cis, trans*)



Ordering Information

Product Name	Column Size	Product Number
COSMOSIL 5PYE	1.0 mm I.D. x 150 mm	02851-71
Packed Column	2.0 mm I.D. x 150 mm	38042-61
	2.0 mm I.D. x 250 mm	34450-31
	4.6 mm I.D. x 150 mm	37837-91
	4.6 mm I.D. x 250 mm	37989-11
	10.0 mm I.D. x 250 mm	37996-11
	20.0 mm I.D. x 250 mm	38044-41
COSMOSIL 5NPE	1.0 mm I.D. x 150 mm	05897-01
Packed Column	2.0 mm I.D. x 150 mm	34328-51
	2.0 mm I.D. x 250 mm	34379-91
	4.6 mm I.D. x 150 mm	37902-21
	4.6 mm I.D. x 250 mm	37990-71
	10.0 mm I.D. x 250 mm	05469-11
	20.0 mm I.D. x 250 mm	38046-21

Other size may be available. Please enquire.

Product Name	Column Size	Product Number
COSMOSIL 5PYE	4.6 mm I.D. x 10 mm	37903-11
Guard Column	10.0 mm I.D. x 20 mm	38041-71
	20.0 mm I.D. x 20 mm	05867-91
	20.0 mm I.D. x 50 mm	34475-21
COSMOSIL 5NPE	4.6 mm I.D. x 10 mm	37904-01
Guard Column	10.0 mm I.D. x 20 mm	38045-31
	20.0 mm I.D. x 20 mm	05868-81
	20.0 mm I.D. x 50 mm	05869-71

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