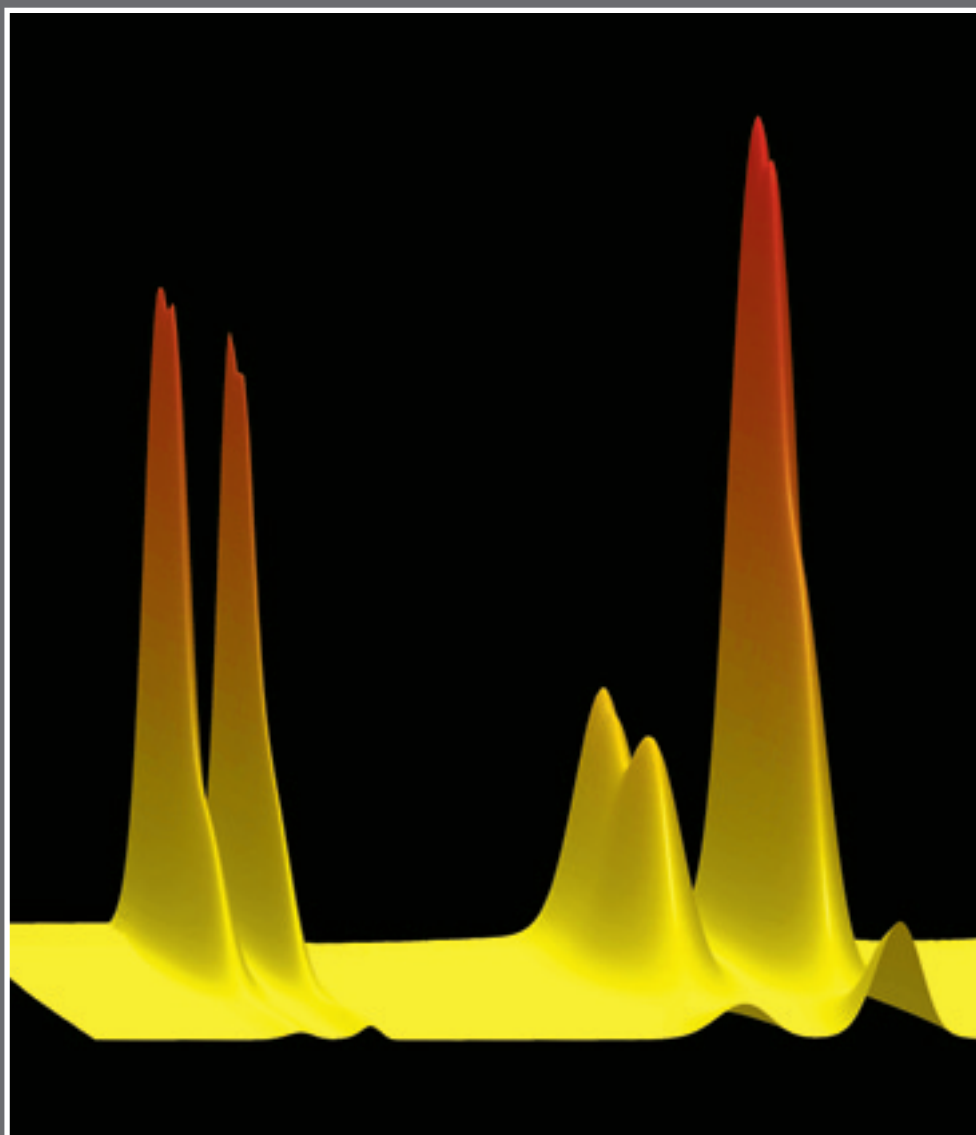


*Kromasil application guide*



**Kromasil®**

*The way to peak performance  
in liquid chromatography*

## ***Kromasil applications – from our lab and the literature***

*The Kromasil packings and columns have been used over the years for demanding separations all over the world. In this guide we have collected examples of a variety of chromatographic separations, from small synthetic pharmaceuticals, up to peptides and larger molecules.*

*We hope this guide will be a useful tool when developing new HPLC separation methods in your lab.*

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*Cover figure shows a 3D chromatographic separation, with UV absorption at different wavelengths vs. time.*

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# The Kromasil packings

## – some hints for the best performance

The Kromasil family of packing materials is developed to be the perfect choice from analytical to process scale. Kromasil is presently available as bare silica, C4, C8, C18, NH2, CN or as Kromasil Chiral for separation of optical isomers. Pore sizes are 60 Å, 100 Å, and 300 Å, and particle sizes 3.5, 5, 7, 10, 13 and 16 µm. Slurry-packed columns are available from analytical up to 2" inner diameter, all with analytical efficiencies. For larger preparative and industrial scale columns bulk packing is provided.

To learn more about the properties of Kromasil silica please consult our other technical information.

## Choice of mobile phase

### Normal Phase conditions

Choose mixtures of hexane or heptane, and polar modifiers like alcohols, ethyl acetate, methylene chloride, etc. to adjust retention. The optimum retention factor range is normally  $2 \leq k \leq 5$  for a two-component sample, but can be wider for a multi-component sample.

Acidic and basic additives can improve the chromatographic performance. In most cases small amounts of acetic acid or formic acid (0.05 – 0.10%) improve peak shape for acidic or basic solutes. In some cases the combination of acid and an organic amine (e.g. triethylamine) is necessary, for difficult

solutes. The acid should always be in excess relative to the amine, in order to operate at a pH where the silanol groups on the silica are protonated.

### Reversed Phase conditions

Choose mixtures of water or buffer, and water miscible solvents like alcohols, acetonitrile, THF, etc. to adjust retention factor  $k$  to an optimal range. The pH can be controlled by using a buffer, and in order to minimize the ionization of the silica and the solutes. In order to control peak shape for very basic solutes an additive like TEA (triethylamine) can be added, if necessary. Kromasil is a fully hydroxylated ultra-pure silica, making the surface less acidic, resulting in good peak shape also for basic compounds.

For the C4, C8 and C18 phases, due to the very hydrophobic nature of the surface, it is important to **always keep at least 4 – 5% of organic in the mobile phase**, both when flushing or running the chromatographic separation. The reason is that in the case of a 100% aqueous mobile phase there is a risk that the surface within the porous system in the Kromasil particles is “dewetted”, resulting in a total or partial loss of retention.

This phenomenon of dewetting is more pronounced for high quality, high coverage materials, where the bonding procedure has been very efficient. This will result not only in higher retention times because

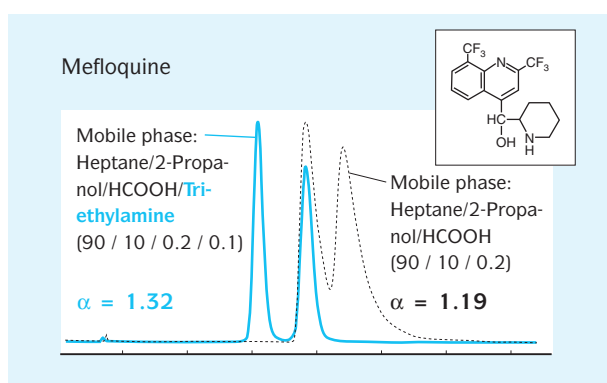


Figure 1 | Influence of the mobile phase additives on the separation of mefloquine.

Conditions: Column: 4.6 × 250 mm, Kromasil CHI-DMB, 5 µm  
Flow rate: 2 ml/min. Detection: UV 280 nm

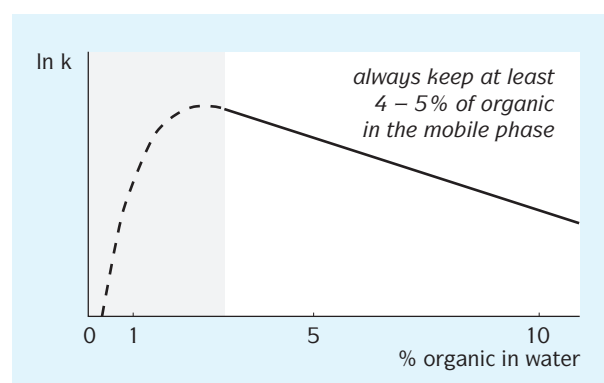


Figure 2 | The retention factor,  $k$ , vs. organic content. General retention behaviour at low organic content using high density RP phases.

Column length (mm)	Particle size ( $\mu\text{m}$ )	Flow rate (ml/min.)	Relative time	Relative $R_s$	Relative $\Delta P$
250	10	0.5	1	1	1
125	5	1.0	0.25	1	4
87.5	3.5	1.43	0.125	1	8

*Table 1 | Relation between optimal flow rate, analysis time and back pressure,  $\Delta P$ , when going to smaller particles, and shorter columns. The comparisons are for a constant resolution,  $R_s$ .*

of a higher coverage and hence hydrophobicity, but also in a higher hydrolytic stability, and a longer life-time of the column.

If a 100% aqueous mobile phase has been used accidentally, and the stationary phase has been dewetted, the column can easily be regenerated. Just flush the column with a mobile phase consisting of 40 – 50% or more of organic for 2 – 5 column volumes. After this the column can be equilibrated again with the mobile phase, and the original retention times should be seen.

We also recommend to always filter buffer solutions in order to remove small particulates. It is also preferable to premix aqueous/organic solutions, in order to avoid problems with gas formation in the mobile phase, or a temperature increase or decrease as an effect of endo- or exothermic mixing heats.

The recommended pH range for our RP phases is between pH 1.5 up to 9.5. However, in some applications mobile phases with pH above 11 have been used for continuous chromatography, for several thousands of column volumes.

## How to improve speed of separation

There is today a strong driving force towards faster separations, and hence smaller particles and shorter columns. A smaller particle will give a higher efficiency at a higher flow rate; for example will a 5  $\mu\text{m}$  particle give twice the efficiency compared to 10  $\mu\text{m}$ , at twice the flow rate. And if the resolution is to be kept constant one can also reduce column length by 50%. Table 1 gives the relation between the critical parameters when going to smaller particles, and shorter columns.

It can be seen that the combination of smaller particles, shorter columns and higher flow rate will result in much faster analyses. The only drawback is the back pressure, which will increase significantly as particle size goes down.

All in all, one will save a factor 2 in analysis time by going from 5 to 3.5  $\mu\text{m}$  for example, but also experience twice the back pressure.

## How to improve resolution

A good resolution in a short period of time is usually a requirement in analytical HPLC. One has essentially three ways to improve the resolution, as can be seen in the equation below:

$$R_s = \frac{1}{4} (\alpha - 1) \cdot \sqrt{N} \cdot \left( \frac{k_1}{1+k_1} \right)$$

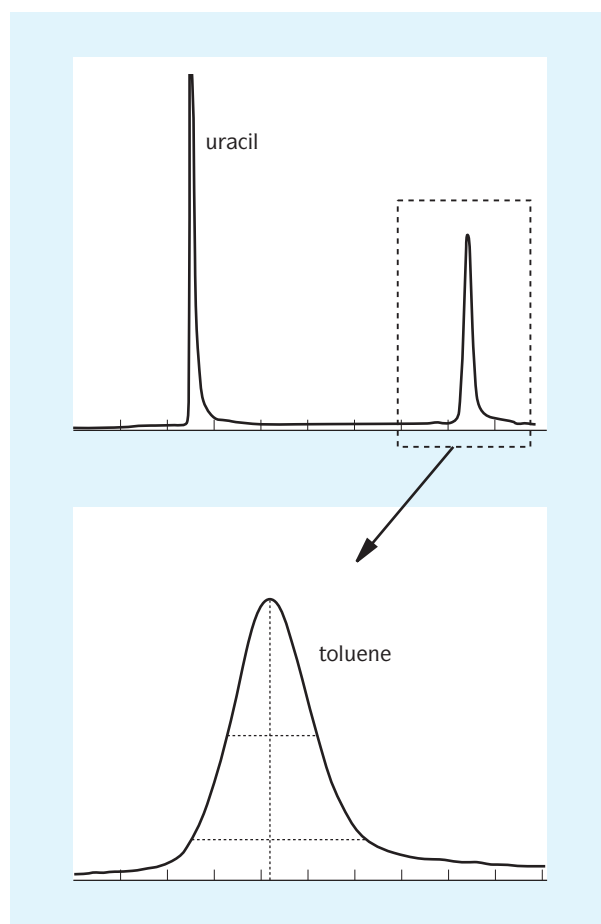
1. **The separation factor,  $\alpha$ , can be increased.** This can be done by optimizing stationary and mobile phase, i.e. choosing the best column and mobile phase composition for the specific application
2. **The number of theoretical plates can be increased.** This can be done by:
  - a. Increasing the column length
  - b. Decreasing the particle size
  - c. Optimizing the flow rate. The optimum for small particles is at a higher flow rate than for larger particles (inverse linear relationship)
3. **The retention factor,  $k$ , can be increased,** if it is too low. This can be done by adjusting the elution strength of the mobile phase

## Scale-up

The analytical separation is very often the start for a scale-up to semi-prep, prep, or large industrial scale chromatography. In the case of Kromasil there is the possibility of seamless scale-up from analytical to semi-prep and prep, and even large diameter Dynamic Axial Compression (DAC) columns. All Kromasil columns independent of diameter are delivered with the same, high efficiency guarantee, and even the large DAC columns can be packed giving the same performance.

We recommend that the method development for the preparative separation is performed using analytical columns, or possibly 10 mm ID if larger volumes of the sample fractions are needed. A small column will make the development work easier, and since the performance is identical in small and large diameter columns, the result in large scale can easily be predicted from the work in small scale. 10  $\mu\text{m}$  particles are recommended, since the efficiency, back pressure, etc. then will be close to the large scale separation. For large scale 10 – 16  $\mu\text{m}$  particles are usually a good choice. However, the performance using a different particle size can easily be predicted.

The optimal running conditions in large industrial scale can also be found by applying a software program, KromaGuide, developed by the Kromasil group. The KromaGuide optimization is part of our technical support to current Kromasil customers, or potential users.



**Figure 3 | Scale-up to an 80 cm ID dynamic axial compression (DAC) column, showing analytical performance. Efficiency was 42,000 plates/meter ( $h = 2.38$ ) and asymmetry<sub>0.1</sub> was 1.19**

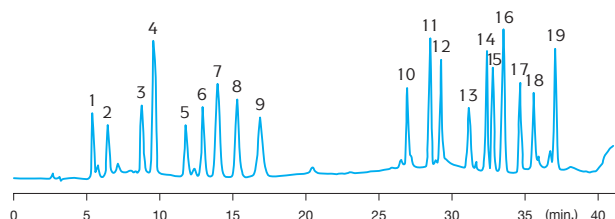
Conditions: Packing material: 83 kg Kromasil 10  $\mu\text{m}$  Bed length: 25 cm  
Eluent: acetonitrile/water (7/3) Flow rate: 20 lit./min.  
Sample: uracil and toluene

# Applications

## Amino acids

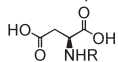
### Amino acids, PTC derivatives

18 amino acids as phenylthiocarbamyl (PTC) derivatives. (ref. 7)

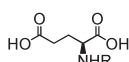


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Temperature: 38 °C  
 Eluent A: 3% ACN in 0.1 M sodium acetate  
 Eluent B: ACN:water (80:20; v:v)

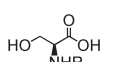
1 = PTC-aspartic acid



2 = PTC-glutamic acid



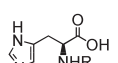
3 = PTC-serine



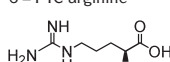
4 = PTC-glycine



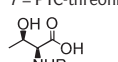
5 = PTC-histidine



6 = PTC-arginine



7 = PTC-threonine



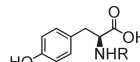
8 = PTC-alanine



9 = PTC-proline



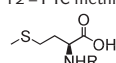
10 = PTC-tyrosine



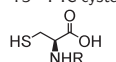
11 = PTC-valine



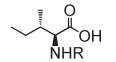
12 = PTC-methionine



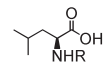
13 = PTC-cysteine



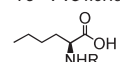
14 = PTC-isoleucine



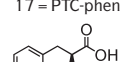
15 = PTC-leucine



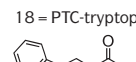
16 = PTC-norleucine (l. S.)



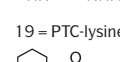
17 = PTC-phenylalanine



18 = PTC-tryptophan



19 = PTC-lysine



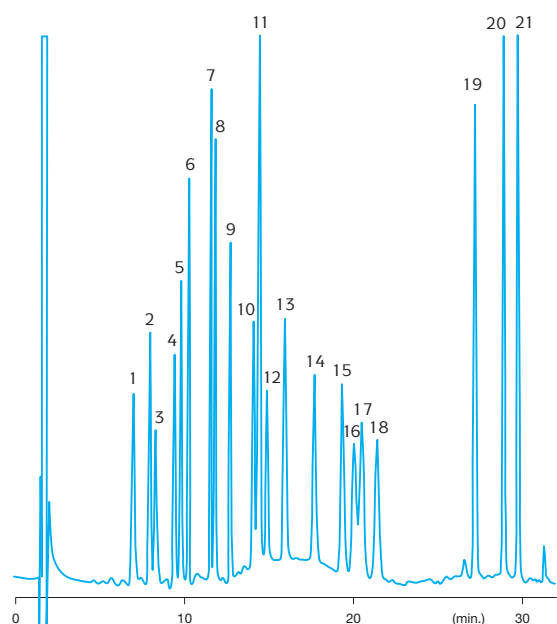
R = PTC derivative group



Gradient: Linear gradient elution. 0 min. 0% B, 13 min. 7% B, 23 min. 23% B, 29 min. 35% B, 35 min. 40% B, 40 min. 100% B, 45 min. 100% B, 47 min. 0% B  
 Flow rate: 1 ml/min.  
 Detection: UV 254 nm

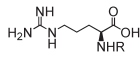
### Amino acids, Fmoc-derivatives

Amino-acid analysis for protein and peptide hydrolysates with precolumn Fmoc (9-fluorenyl methylchloroformate) derivatization. (ref. 30)

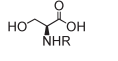


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4 × 250 mm  
 Temperature: 45 °C  
 Eluent A: sodium acetate buffer (100 mM, pH 4.4):THF:ACN (75:15:10; v:v:v)  
 Eluent B: ACN:THF (85:15; v:v)  
 Gradient: 0 – 2.5 min. 0% B, 2.5 – 6.6 min. 7% B, 6.6 – 8.3

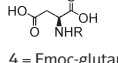
1 = Fmoc-arginine



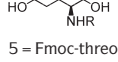
2 = Fmoc-serine



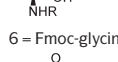
3 = Fmoc-aspartic acid



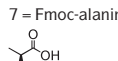
4 = Fmoc-glutamic acid



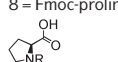
5 = Fmoc-threonine



6 = Fmoc-glycine



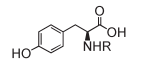
7 = Fmoc-alanine



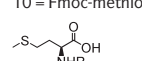
8 = Fmoc-proline



9 = Fmoc-tyrosine



10 = Fmoc-methionine



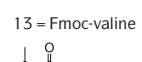
11 = Fmoc-OH



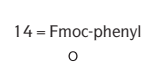
12 = Fmoc-NH<sub>2</sub>



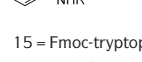
13 = Fmoc-valine



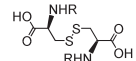
14 = Fmoc-phenylalanine



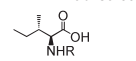
15 = Fmoc-tryptophane



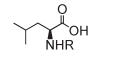
16 = Fmoc-cystine



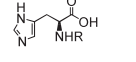
17 = Fmoc-isoleucine



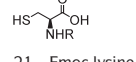
18 = Fmoc-leucine



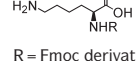
19 = Fmoc-histidine



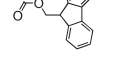
20 = Fmoc-cysteine



21 = Fmoc-lysine



R = Fmoc derivative group

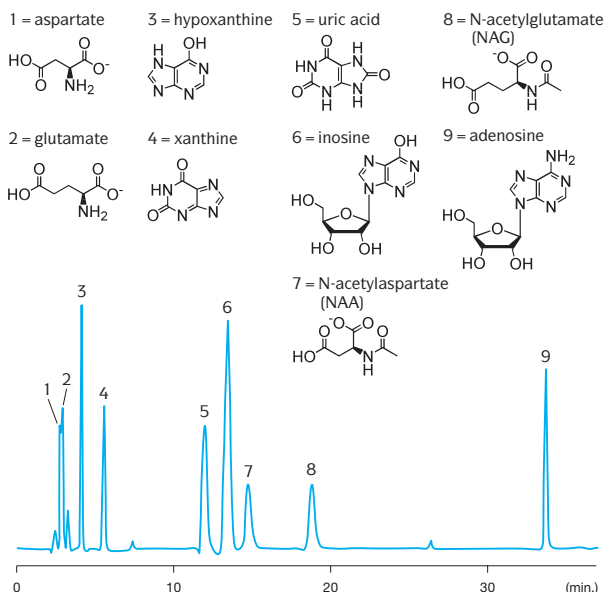


min. 14% B, 8.3 – 8.4 min. 21% B, 8.4 – 10 min.  
 21% B, 10 – 10.1 min. 17% B, 10.1 – 20 min. 19% B, 20 – 29 min. 55% B, 29 – 30 min. 100% B  
 Flow rate: 1.5 ml/min.  
 Detection: UV 263 nm

# Amino acids

## Amino acids

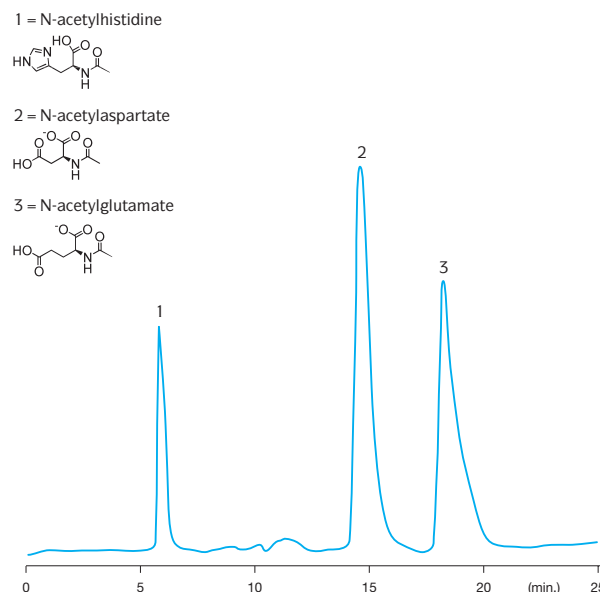
Detection of N-acetylaspartate and N-acetylglutamate in cerebral tissue extracts. (ref. 228)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 23 °C  
 Eluent: 2.8 mM tetrabutylammonium hydroxide,  
 25 mM KH<sub>2</sub>PO<sub>4</sub>, 1.25% MeOH (pH 7)  
 Flow rate: 1 ml/min.  
 Detection: UV 210 nm

## Amino acids, N-acetylated

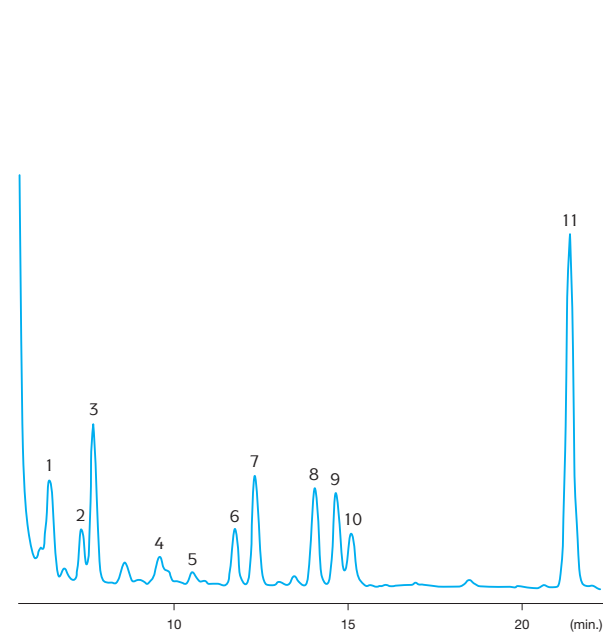
Separation of N-acetylated amino acids. (ref. 348)



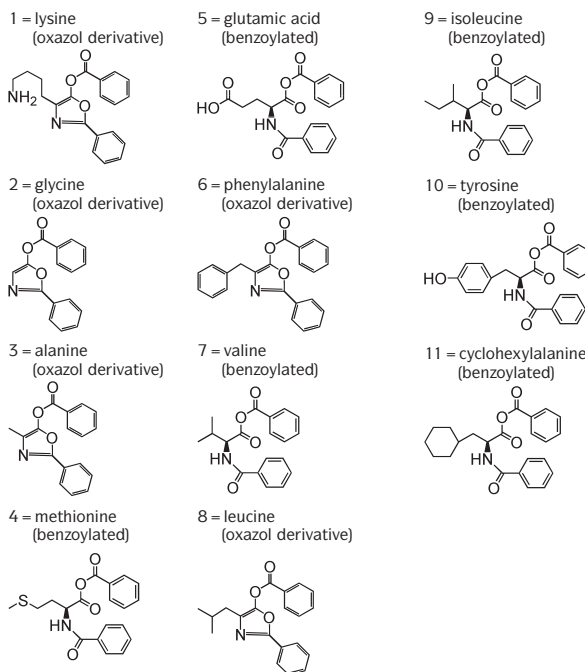
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 23 °C  
 Eluent: tetrabutylammonium hydroxide 2.8 mM;  
 KH<sub>2</sub>PO<sub>4</sub>, 25 mM and 1.25% MeOH, pH 7  
 Flow rate: 1 ml/min.  
 Detection: UV 210 nm

## Amino acids, benzoylated

Analysis of benzoylated amino acids. (ref. 51a)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 250 mm  
 Eluent: acetonitrile-water mixtures  
 Gradient: 70 – 95% ACN in 30 min.  
 Flow rate: 1 ml/min.  
 Detection: UV 274 nm



## Amino acids

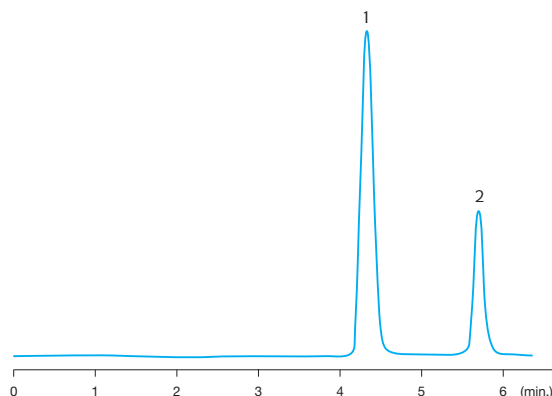
### Aminosalicylic acids

Determination of 5-aminosalicylic acid and 3-aminosalicylic acid. (ref. 279)

1 = 5-aminosalicylic acid



2 = 3-aminosalicylic acid

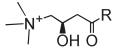


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Eluent: MeOH:phosphate buffer (35:65; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 254 nm

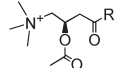
### Carnitines, aminoanthracene derivatives

Determination of L-carnitine, acetyl-L-carnitine and propionyl-L-carnitine in human plasma by HPLC with post-column derivatization with 1-aminoanthracene. (ref. 66)

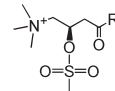
1 = L-carnitine 1-aminoanthraceneamide



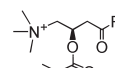
2 = acetyl-L-carnitine 1-aminoanthraceneamide



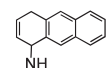
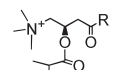
3 = methansulfonyl-L-carnitine 1-aminoanthraceneamide



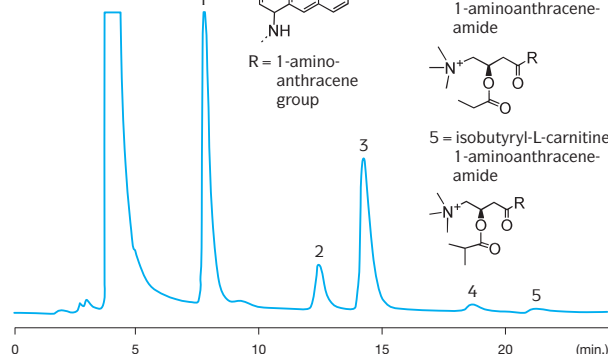
4 = propionyl-L-carnitine 1-aminoanthraceneamide



5 = isobutyryl-L-carnitine 1-aminoanthraceneamide



R = 1-aminoanthracene group



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: ACN:ammonium acetate (0.1 M, pH 3.5) (30:70; v:v)  
 Flow rate: 1.3 ml/min.  
 Detection: spectrofluorimetric ( $\lambda_{ex}$  248 nm,  $\lambda_{em}$  418 nm)

### Boronophenylalanine

Determination of boronophenylalanine in biological samples after precolumn derivatization with o-phthalaldehyde (OPA). (ref. 237)

1 = OPA-aspartic acid



2 = OPA-glutamic acid



3 = OPA-asparagine



4 = OPA-histidine



5 = OPA-serine



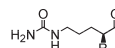
6 = OPA-glutamine



7 = OPA-arginine



8 = OPA-citrulline



9 = OPA-glycine



10 = OPA-threonine



11 = OPA-γ-aminobutyric acid (GABA)



12 = OPA-alanine



13 = OPA-tyrosine



14 = OPA-p-boronophenylalanine



15 = OPA-valine



16 = OPA-phenylalanine



17 = OPA-isoleucine



18 = OPA-leucine



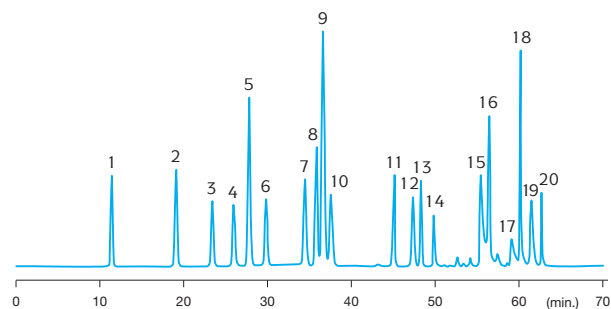
19 = OPA-ornithine



20 = OPA-lysine



R = OPA derivative group



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 23 °C  
 Eluent A: 50 mM CH<sub>3</sub>COONa (pH 7.4) : 50 mM NaHPO<sub>4</sub> (pH 7.4) : MeOH : THF (48:48:2:2; v:v:v:v)  
 Eluent B: MeOH:water (65:35; v:v).

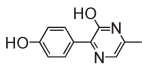
Gradient: 80% A in 3 min, 80% – 70% A in 12 min, 70% – 50% A in 15 min, 50% – 45% A in 10 min, 45% – 20% A in 10 min, 20% – 15% A in 5 min, 15% – 10% A in 3 min, 10% – 0% A in 2 min, 0% A in 15 min.  
 Flow rate: 1.2 ml/min.  
 Detection: spectrofluorimetric ( $\lambda_{ex}$  330 nm,  $\lambda_{em}$  430 nm)

# Drugs and metabolites

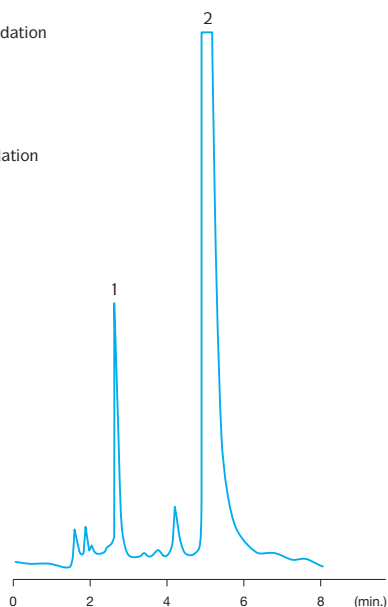
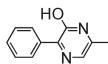
## Amoxicillin

Measurement of amoxicillin in gastric tissue samples. (ref. 6)

1 = amoxicillin degradation derivative



2 = ampicillin degradation derivative (I. S.)

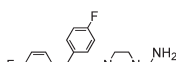


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 3.2 × 150 mm  
 Temperature: 40 °C  
 Eluent: MeOH-water (55:45; v:v)  
 Flow rate: 0.4 ml/min.  
 Detection: fluorescence ( $\lambda_{\text{ex}}$  365 nm,  $\lambda_{\text{em}}$  445 nm)

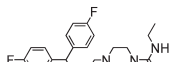
## Amperozide

Separation of amperozide, derivate and metabolite. (ref. 45)

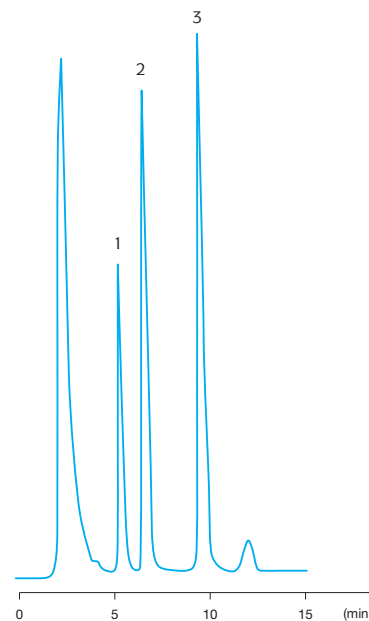
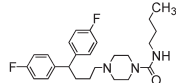
1 = amperozide's N-de-ethyl metabolite (II)



2 = amperozide (I)



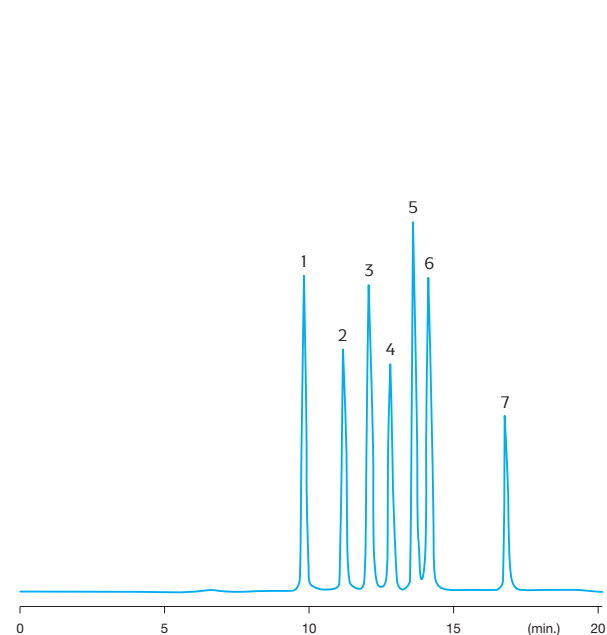
3 = amperozide's N-de-ethyl-N-butyl analogue (III)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 2.1 × 200 mm  
 Eluent: MeOH:ammonium phosphate buffer (pH 7.8) (78:22; v:v)  
 Flow rate: 0.2 ml/min.  
 Detection: UV 265 nm

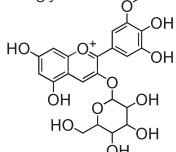
## Anthocyanidins

Separation of cyanidin from 3-O-β-glycosylated anthocyanidins. (ref. 347)

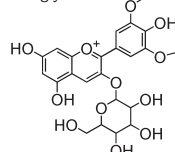


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 23 °C  
 Eluent A: HCOOH:water (1:10; v:v)  
 Eluent B: HCOOH:water:MeOH (1:9:10; v:v:v)  
 Gradient: 0% – 60% A in 5 min., 60% – 45% A in 5 min., 45% – 0% A in 6 min., 0% A in 10 min.

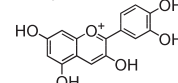
1 = petunidin-3-O-β-glycoside



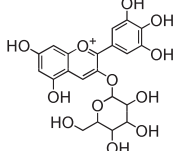
4 = malvidin-3-O-β-glycoside



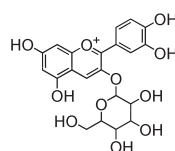
7 = cyanidin



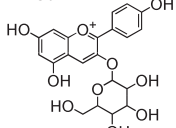
2 = delphinidin-3-O-β-glycoside



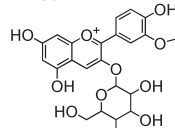
5 = cyanidin-3-O-β-glycoside



3 = pelargonidin-3-O-β-glycoside



6 = peonidin-3-O-β-glycoside

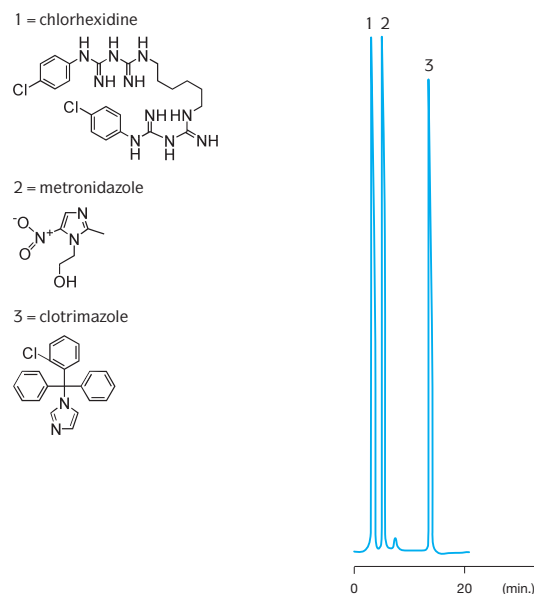


Flow rate: 1.2 ml/min.  
 Detection: 520 nm

## Drugs and metabolites

### Antibacterial drugs

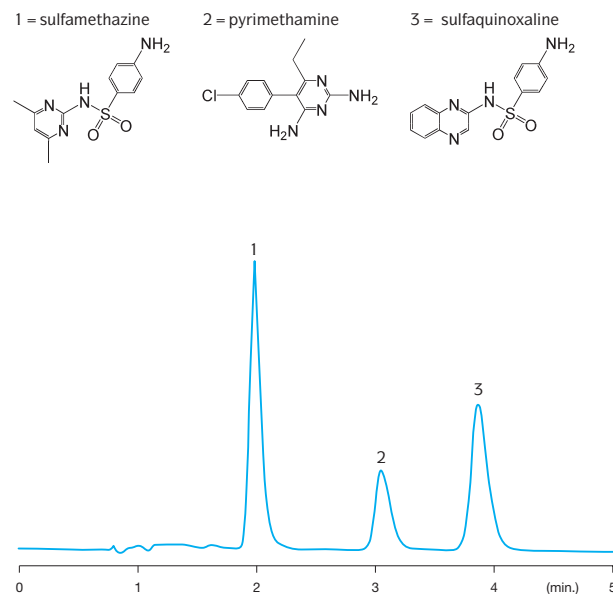
Determination of metronidazole, clotrimazole and chlorhexidine acetate in Shuangzuo effervescent tablets. (ref. 23)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: MeOH:buffer (70:30; v:v) (NaAc 24.4 g, HAc 80 ml, (C<sub>4</sub>H<sub>9</sub>)NBr 4.83 g in 1000 ml water, pH 3.6)  
 Flow rate: 1 ml/min.  
 Detection: UV 260 nm

### Antibacterial drugs, veterinary

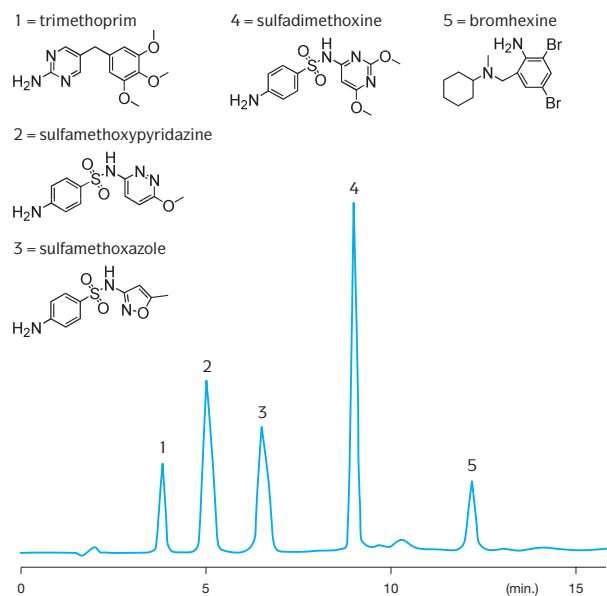
Simultaneous determination of sulfaquinoxaline, sulfamethazine and pyrimethamine. (ref. 246)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: 40 mM phosphate buffer (pH 3 containing 10 mM ClO<sub>4</sub><sup>-</sup>) : ACN (65:35; v:v)  
 Flow rate: 1.5 ml/min.  
 Detection: UV 270 nm

### Antibacterials, sulfa drugs

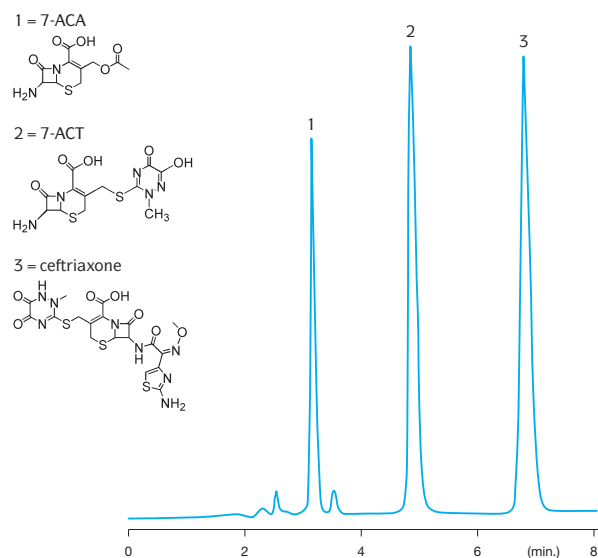
Determination of sulfamethoxypyridazine, sulfamethoxazole, sulfadimethoxine and associated compounds. (ref. 267)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: 10 mM citrate buffer (pH 3):MeOH  
 Gradient: 0 min. 31% MeOH, 4 min. 69% MeOH, 14 min. 69% MeOH, 16 min. 31% MeOH  
 Flow rate: 1 ml/min.  
 Detection: UV 255 nm

### Antibiotics and intermediates

Determination of ceftriaxone, 7-aminocephalosporanic acid (7-ACA) and 7-amino-3-[[[2,5-dihydro-6-hydroxy-2-methyl-5-oxo-1,2,4-triazin-3-yl]-thio]methyl]-cephalosporanic acid (7-ACT). (ref. 129)

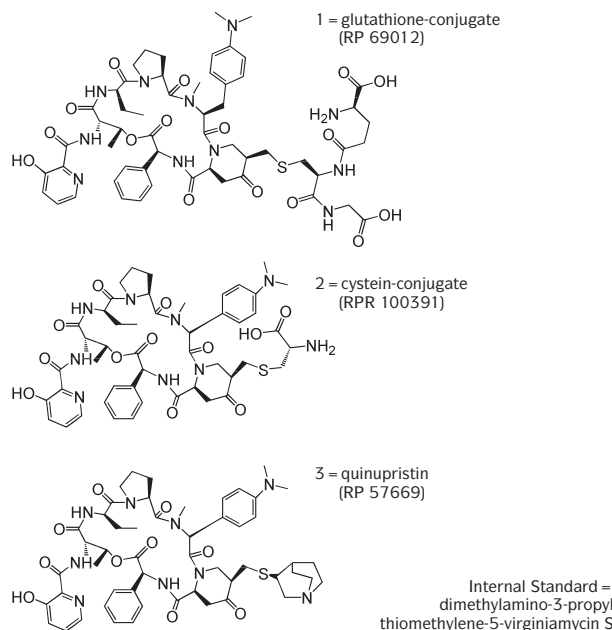
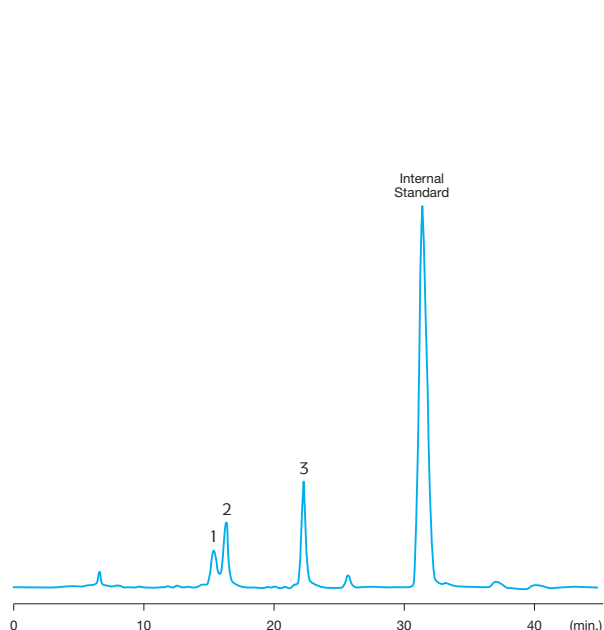


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Eluent: ACN:tetrabutyl ammonium bromide:phosphate buffer (pH 7):water (32:0.32:4.4:63.6; v:v:v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 270 nm

# Drugs and metabolites

## Antibiotics and metabolites

Determination of quinupristin and its main metabolites in human plasma. (ref. 143)

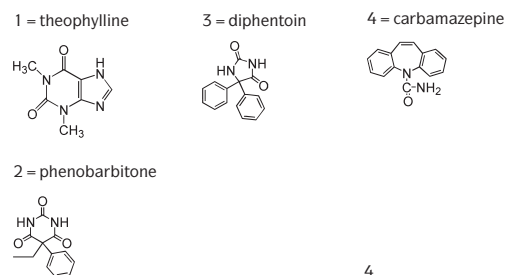
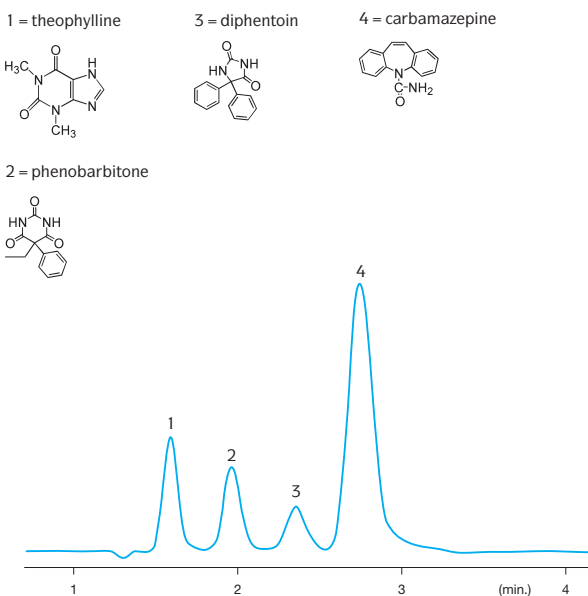


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 125 mm  
 Eluent A: 0.8 ml of 70% perchloric acid (PCA) / litre water  
 Eluent B: ACN  
 Gradient: 30% B for 11 min., 32% B from 11.1 to 15 min., 40% B from 15.6 to 16 min., 38% B from 16.1 to 34 min., 80% B from 34.1 to 36 min.

Flow rate: 0 – 11 min: 0.5 ml/min., 11 – 36 min: 1 ml/min.  
 Detection: fluorescence ( $\lambda_{ex}$  360 nm and  $\lambda_{em}$  410 nm)

## Anticonvulsants

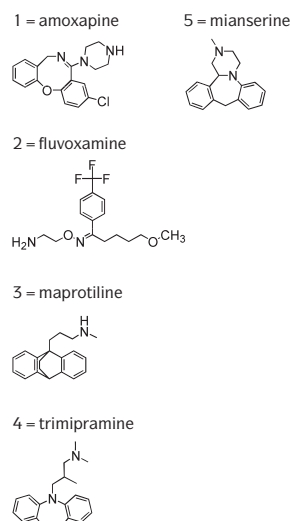
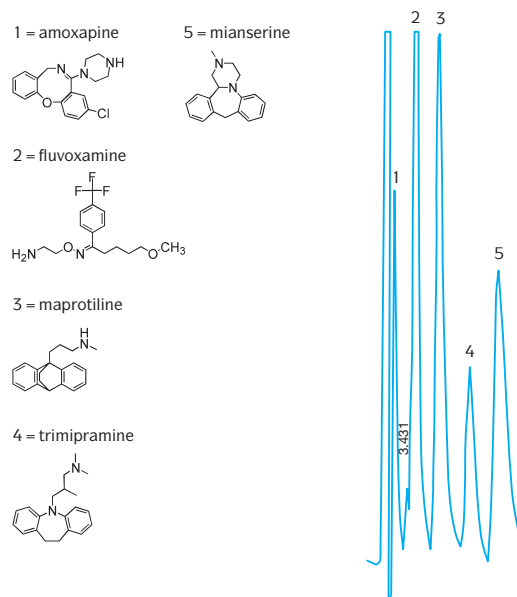
Determination of theophylline, phenobarbitone, diphenoin and carbamazepine. (ref. 301b)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.8 × 150 mm  
 Eluent: MeOH:water (70:30; v:v)  
 Flow rate: 35 µl/min  
 Detection: UV 210 nm

## Antidepressants

Determination of antidepressant drugs and metabolites. (ref. 49)

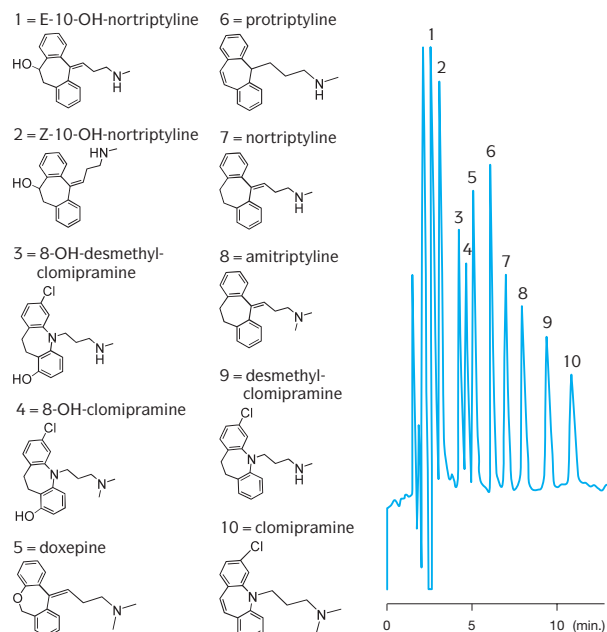


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 2.1 × 150 mm  
 Eluent: ACN:phosphate buffer (40:60; v:v) (pH 6.5)  
 Flow rate: 0.35 ml/min.  
 Detection: UV 220 nm

# Drugs and metabolites

## Antidepressants

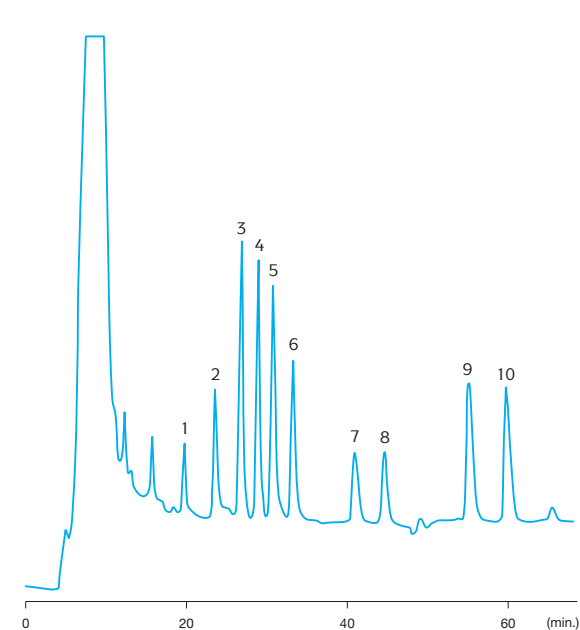
Analysis of amitriptyline and nortriptyline in plasma. (ref. 58)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4 × 250 mm  
 Temperature: ambient  
 Eluent: ACN:KH<sub>2</sub>PO<sub>4</sub> (0.04 M) (40:60; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 240 nm

## Antidepressants and metabolites

Simultaneous determination of citalopram, fluoxetine, paroxetine and their metabolites in plasma. (ref. 309)



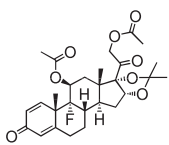
Phase: Kromasil 100 Å, 3.5 µm, C18  
 Column: 0.32 × 300 mm  
 Temperature: gradient: 35 °C (3 min.) prior to ramp of 1.3 °C/min. to 100 °C (10 min.)  
 Eluent: ACN:NH<sub>4</sub>HCOO (45 mM, pH 4) (25:75; v:v)  
 Flow rate: 5 µl/min  
 Detection: UV 230 nm

## Drugs and metabolites

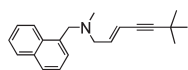
## Antifungals

Determination of terbinafine hydrochloride, chlorhexidine and triamcinolone acetonide acetate. (ref. 110)

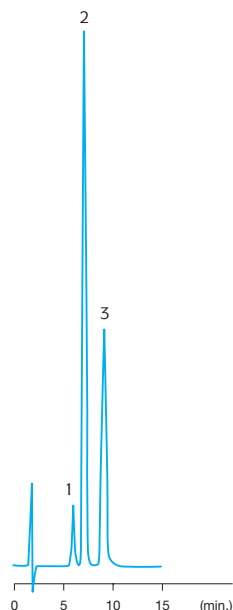
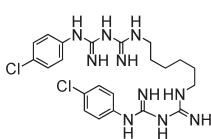
1 = triamcinolone acetonide acetate



2 = terbinafine



3 = chlorhexidine

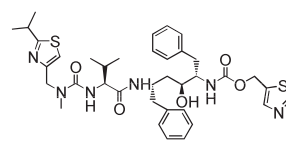


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Eluent: 0.3% sodium heptanesulphonate in MeOH:water (73:27; v:v), pH 3.2  
 Flow rate: 1 ml/min.  
 Detection: UV 248 nm

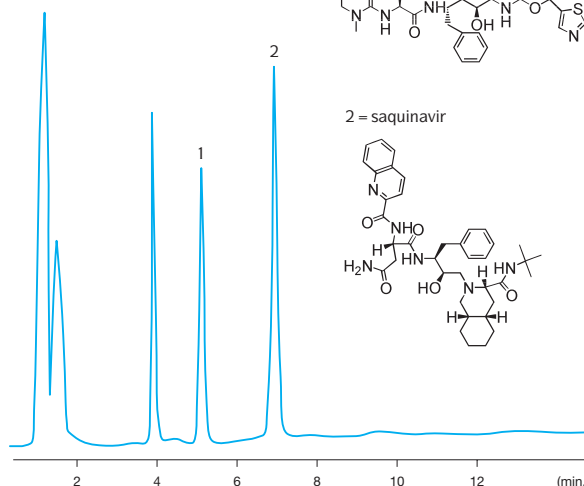
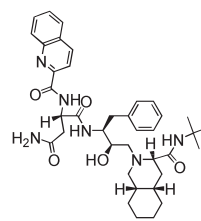
## Anti-HIV

Simultaneous determination of ritonavir and saquinavir. (ref. 126)

1 = ritonavir



2 = saquinavir



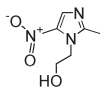
Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 150 mm  
 Eluent: ACN : 5 mM potassium phosphate monobasic buffer, pH 8 (55:45; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 240 nm

## Antimicrobials

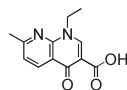
Determination of metronidazole and nalidixic acid. (ref. 156)

1

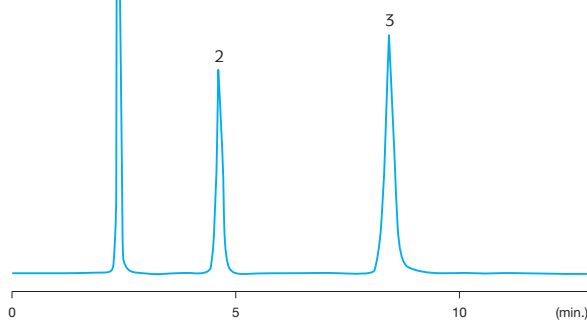
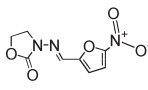
1 = metronidazole



3 = nalidixic acid



2 = furazolidone

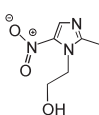


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Temperature: 20 °C ± 1 °C  
 Eluent: ACN:0.2% triethylamine (pH 3.5) (35:65; v:v)  
 Flow rate: 1.5 ml/min.  
 Detection: UV 320 nm

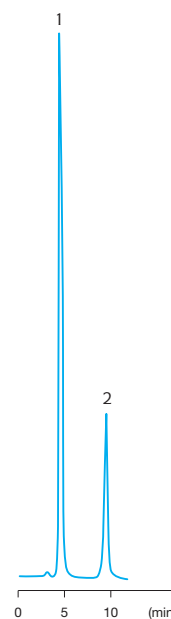
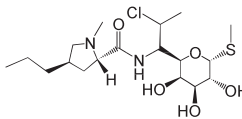
## Antimicrobials

Determination of metronidazole and clindamycin. (ref. 268)

1 = metronidazole



2 = clindamycin

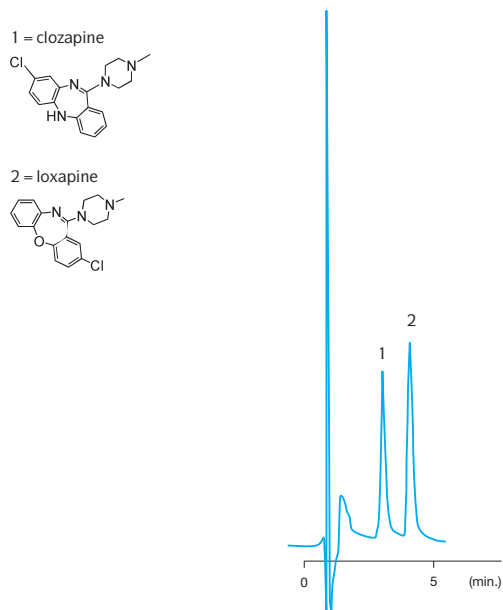


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: Potassium dihydrogen phosphate (pH 3.8, 0.05 M):ACN (79:21; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 210 nm

## Drugs and metabolites

### Antipsychotics

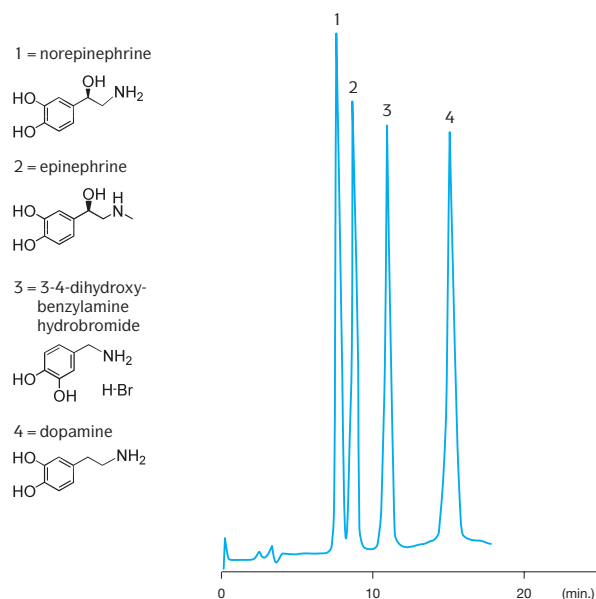
Determination of clozapine and loxapine. (ref. 64)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 150 mm  
 Temperature: 31 °C  
 Eluent: ACN:water (70:30; v:v) 25 mg ammonium acetate /100 ml mobile phase  
 Flow rate: 1.4 ml/min.  
 Detection: UV 210 nm

### Catecholamines

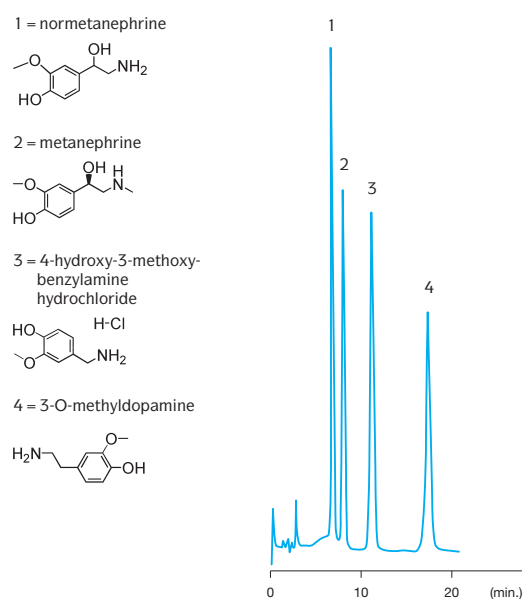
Determination of catecholamines in pig liver. (ref. 95a)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 150 mm  
 Eluent: 300 ml MeOH + 1.5 ml 1-octanesulfonic acid (200 mg/ml) + 100 ml 1 M NaAc + about 1 litre water (pH 3.8). Volume adjusted to 2 litres with water.  
 Flow rate: 0.6 ml/min.  
 Detection: electrochemical potential +0.65 V

### Catecholamines

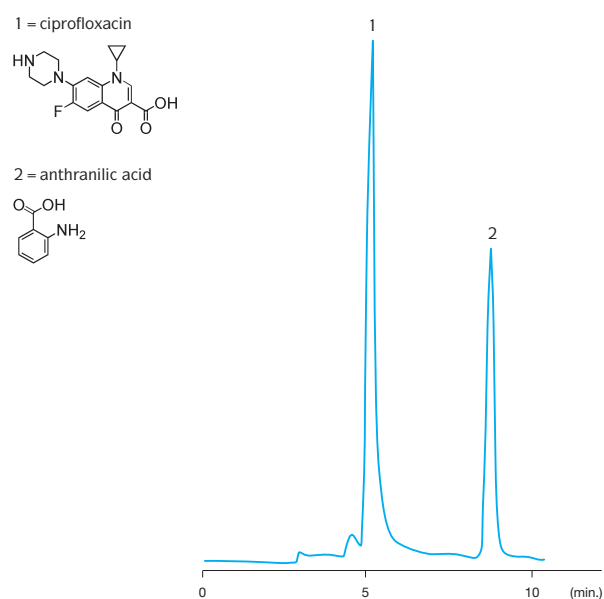
Determination of methoxycatecholamines in pig liver. (ref. 95b)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 150 mm  
 Eluent: 300 ml MeOH + 1.5 ml 1-octanesulfonic acid (200 mg/ml) + 100 ml 1 M NaAc + about 1 litre water (pH 3.8). Volume adjusted to 2 litres with water.  
 Flow rate: 1.1 ml/min.  
 Detection: electrochemical potential +0.8 V

### Ciprofloxacin

Determination of ciprofloxacin in pharmaceutical preparations and biological fluids. (ref. 26)



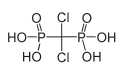
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: ACN:MeOH:acetate buffer (pH 3.6; 50 mM) (10:30:60; v:v:v) containing 1% v/v HAC  
 Flow rate: 0.8 ml/min.  
 Detection: fluorescence ( $\lambda_{\text{ex}}$  300 nm,  $\lambda_{\text{em}}$  458 nm)

# Drugs and metabolites

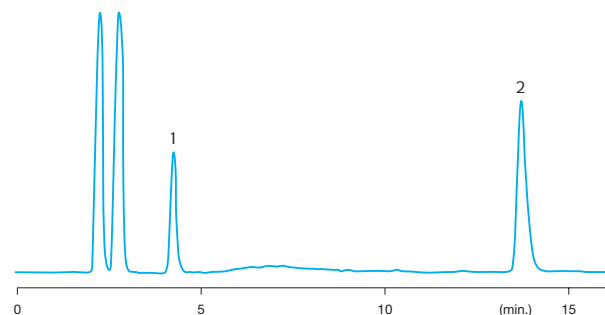
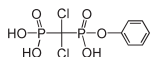
## Clodronate

Simultaneous determination of clodronate and its partial ester derivative. (ref. 97)

1 = clodronate



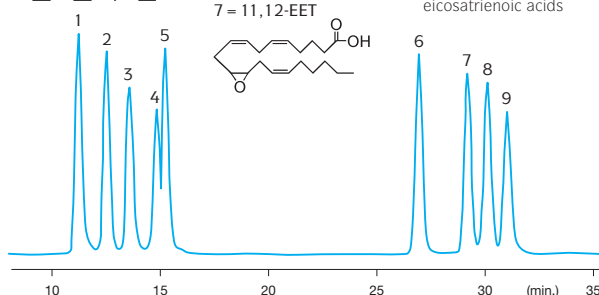
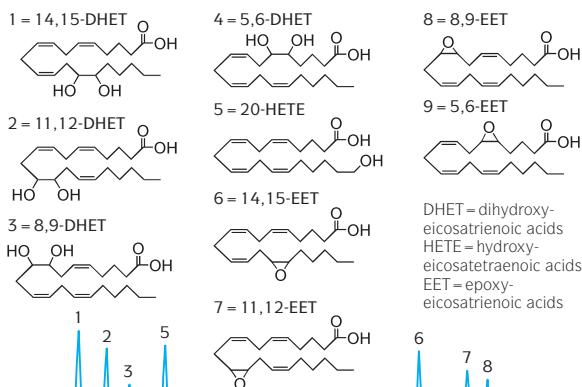
2 = clodronate monophenylester



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Eluent: MeOH:ammonium acetate buffer (0.1 M + 0.23 M butylamine, pH 4.6)  
 Gradient: linear gradient elution: methanol from 3 to 40 – 60% for between 1.0 and 6.0 min. (not specified)  
 Flow rate: 1.2 ml/min.  
 Detection: ELS

## Cytochrome P450 metabolites

Analysis of cytochrome P450 metabolites of arachidonic acid. (ref. 10)

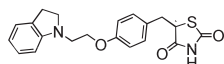


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 2 × 250 mm  
 Eluent: water/ACN with 0.005% HAC  
 Gradient: 0 min. 60% ACN, 30 min. 80% ACN, 35 min. 100% ACN 40 min. 100% ACN  
 Flow rate: 0.2 ml/min.  
 Detection: ESI-MS

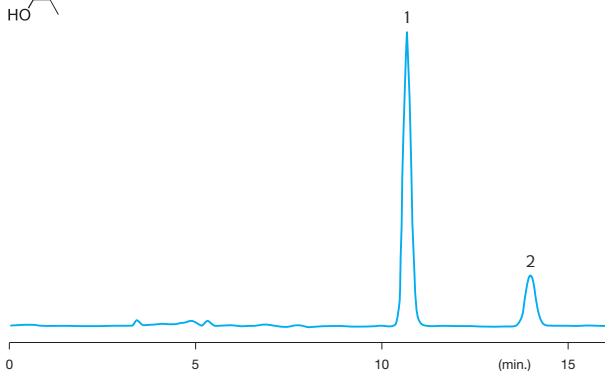
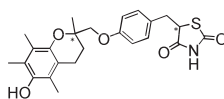
## DRF-2189

Determination of the insulin sensitizing agent DRF-2189 in rat plasma. (ref. 161)

1 = insulin sensitizing agent DRF-2189



2 = troglitazone

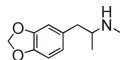


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: 0.05 M NaH<sub>2</sub>PO<sub>4</sub>:ACN:MeOH (22.5:37.5:40; v:v:v) (pH 5.0)  
 Flow rate: 1 ml/min.  
 Detection: fluorescence (λ<sub>ex</sub> 292 nm and λ<sub>em</sub> 325 nm)

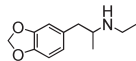
## Ecstasy analogues

Identification of a homologue derivative of "ecstasy". (ref. 170)

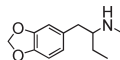
1 = N-methyl-1-(1,3-benzodioxol-5-yl)-2-propanamine (MDMA)



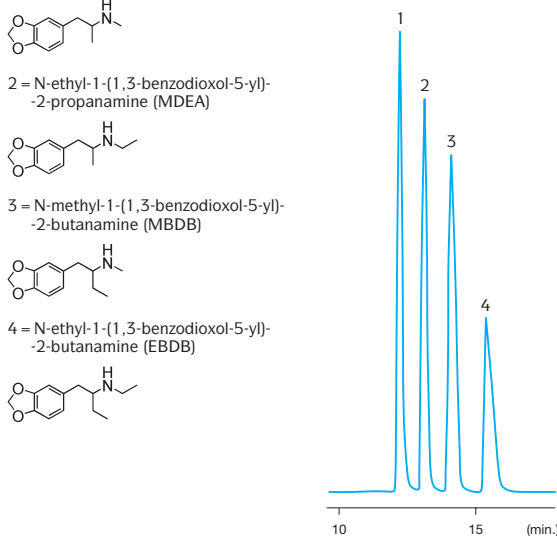
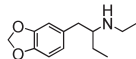
2 = N-ethyl-1-(1,3-benzodioxol-5-yl)-2-propanamine (MDEA)



3 = N-methyl-1-(1,3-benzodioxol-5-yl)-2-butanamine (MBDB)



4 = N-ethyl-1-(1,3-benzodioxol-5-yl)-2-butanamine (EBDB)



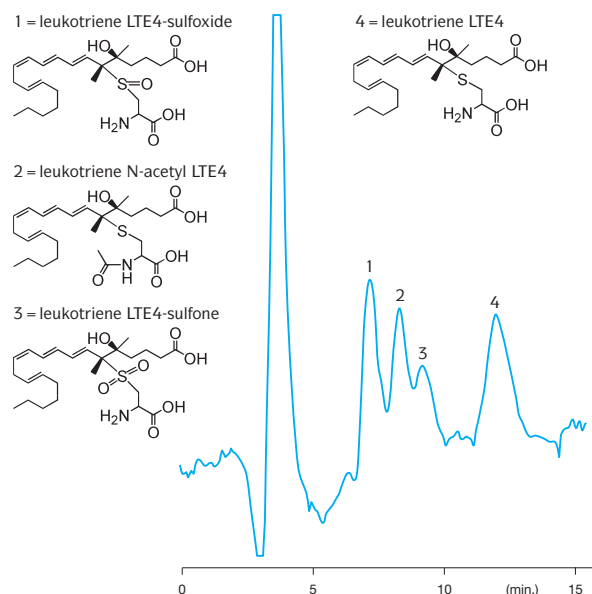
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: ACN:0.1 M triethylammonium acetate (aq) pH 7.3  
 Gradient: 5% to 80% ACN in 25 min.  
 Flow rate: 1 ml/min.  
 Detection: UV 280 nm



# Drugs and metabolites

## Leukotrienes, cross-reactive

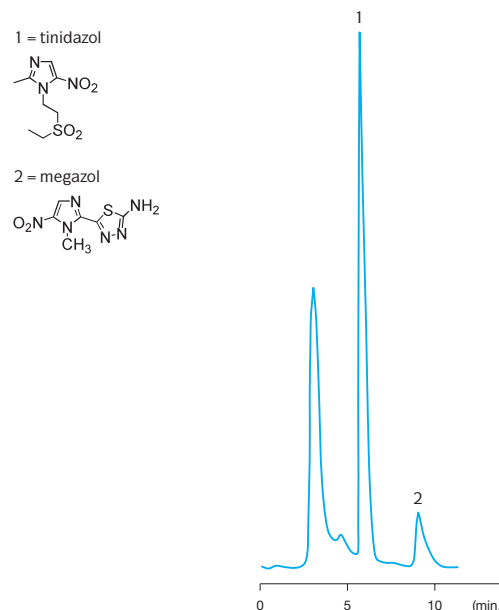
Determination of cross-reactive leukotrienes in biological matrices. (ref. 71b)



Phase: Kromasil 100 Å, 5 µm, C4  
 Column: 2.1 × 100 mm  
 Eluent: ACN:K<sub>2</sub>HPO<sub>4</sub> 10 mM (pH 7.4) (30:70; v:v)  
 Flow rate: 0.2 ml/min.  
 Detection: fluorescence (λ<sub>ex</sub> 544 nm, λ<sub>em</sub> 572 nm)

## Megazol

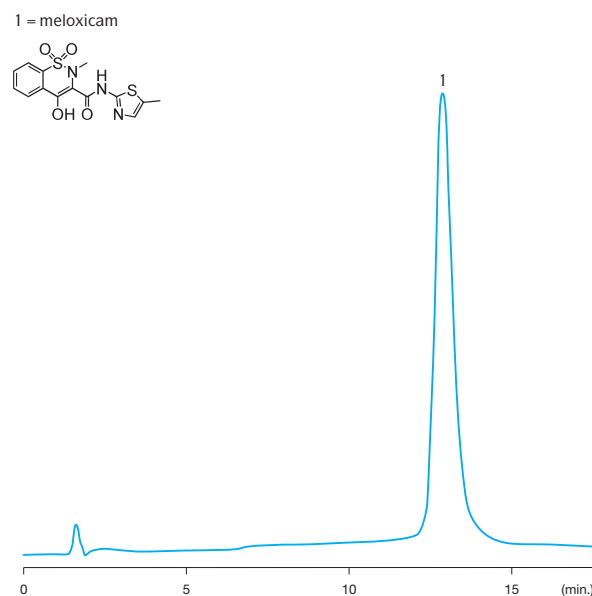
Analysis of megazol in human plasma. (ref. 113)



Phase: Kromasil 100 Å, 10 µm, C8  
 Column: 4 × 250 mm  
 Temperature: ambient  
 Eluent: phosphate buffer (0.068 M, pH 3):MeOH:ACN (65:20:15; v:v:v)  
 Flow rate: 0.7 ml/min.  
 Detection: UV 360 nm

## Meloxicam

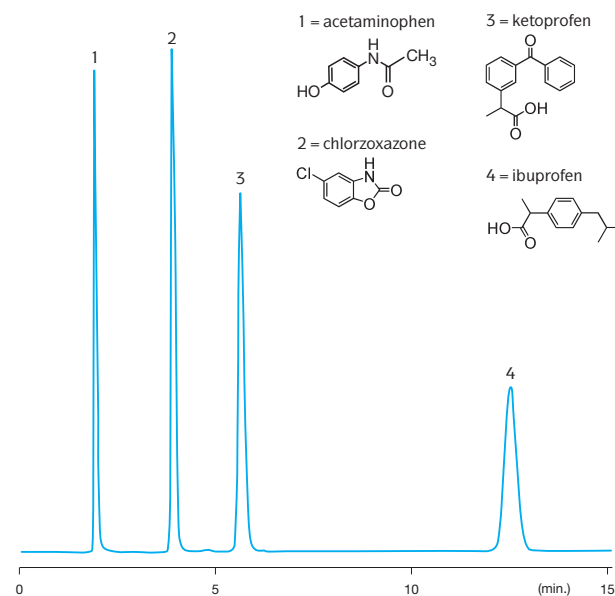
Determination of meloxicam in human plasma. (ref. 283)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: MeOH:water:ACN:HAc (600:500:50:20; v:v:v:v) + 1.01 g sodium heptanesulfonate  
 Flow rate: 1 ml/min.  
 Detection: UV 355 nm

## Pain relievers

Determination of acetaminophen, ibuprofen and chlorzoxazone. (ref. 154)

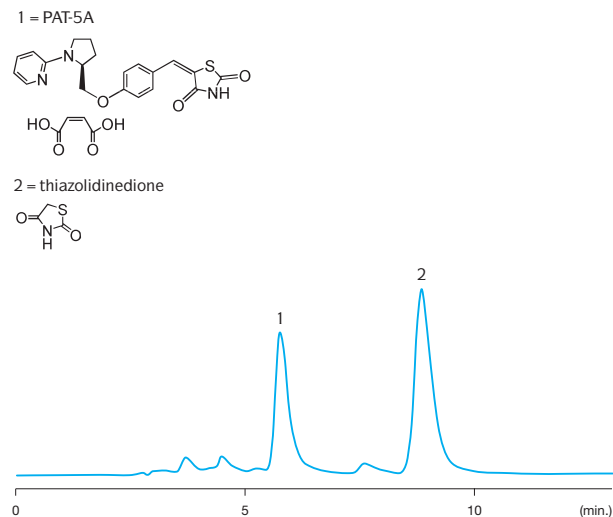


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Temperature: 20 ± 1 °C  
 Eluent: ACN:0.2% triethylamine (pH 3.2) (50:50; v:v)  
 Flow rate: 1.5 ml/min.  
 Detection: UV 215 nm

## Drugs and metabolites

### PAT-5A

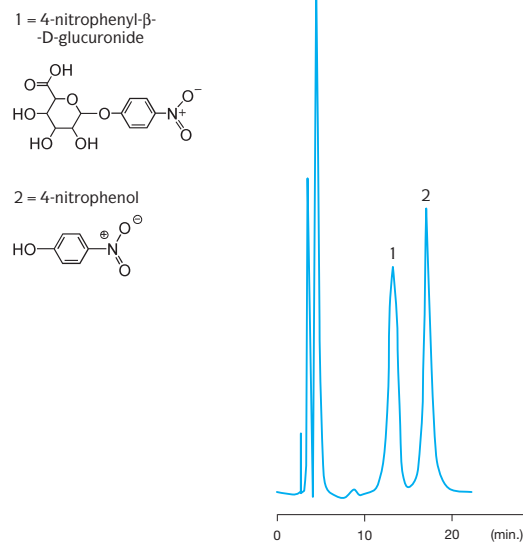
Determination of PAT-5A (5[4-[N-(20pyridyl)-(2s)-pyrrolidine-2-methoxy]phenylmethylene]-thiazolidine-2,4-dione, maleic acid salt), an insulin sensitizing agent, in rat plasma. (ref. 244)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: NaH<sub>2</sub>PO<sub>4</sub> (0.05 M, pH 4):MeOH (25:75; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 345 nm

### Phenolics

Separation of phenolic compounds and corresponding glucuronides. (ref. 103)

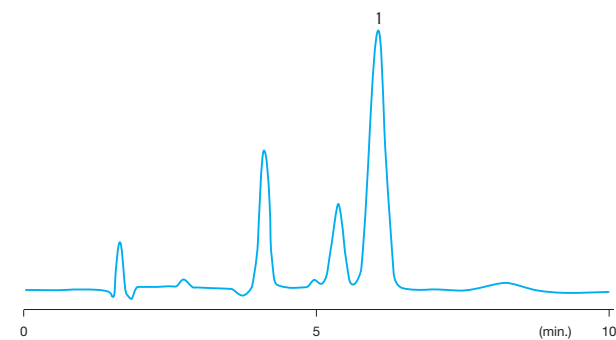
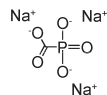


Phase: Kromasil 100 Å, 5 µm, C18  
 Precolumn: Nucleosil 5µm, C4  
 Column: 4.6 × 100 mm (precolumn: 4.6 × 50 mm)  
 Temperature: ambient  
 Eluent: 30 mM cetyltrimethylammonium bromide in 0.05 M 6-aminohexanoic acid (pH: 5) and 20% ACN (precolumn 7%) (v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 300 nm

### Phosphonoformate (foscarnet)

Determination of phosphonoformate (foscarnet) in human serum. (ref. 217)

1 = phosphonoformate (foscarnet)

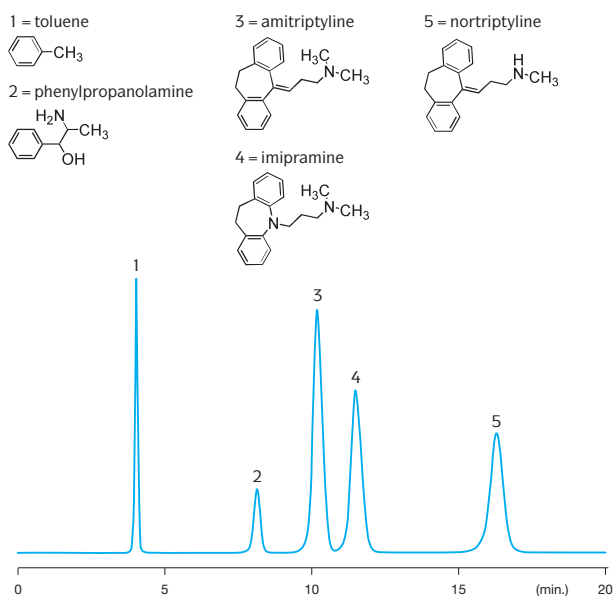


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: methanol : 40 mM Na<sub>2</sub>HPO<sub>4</sub>-buffer, pH 7.6 (adjusted with orthophosphoric acid), containing 0.25 mM THAHSO<sub>4</sub> (25:75; v:v)  
 Flow rate: 1 ml/min.  
 Detection: electrochemical (potential +1.125 V)

# Drugs and metabolites

## QC test, tricyclic antidepressants

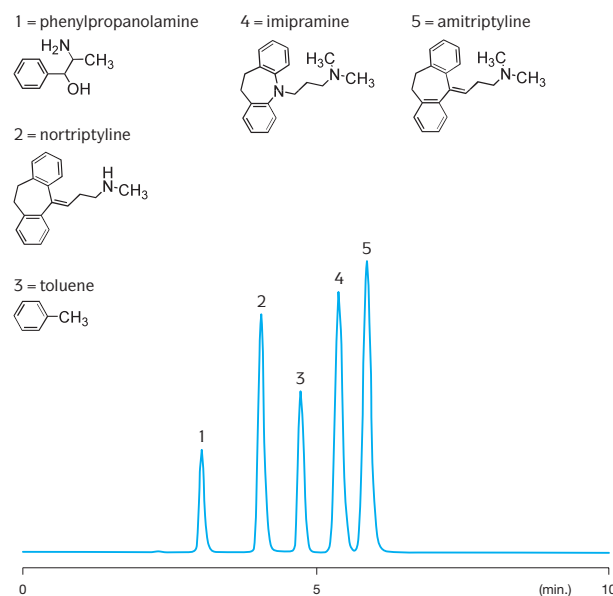
QC test of Kromasil CN. (ref. 342)



Phase: Kromasil 60 Å, 10 µm, CN  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:KH<sub>2</sub>PO<sub>4</sub> 25 mM pH 6.0 (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 215 nm

## QC test, tricyclic antidepressants

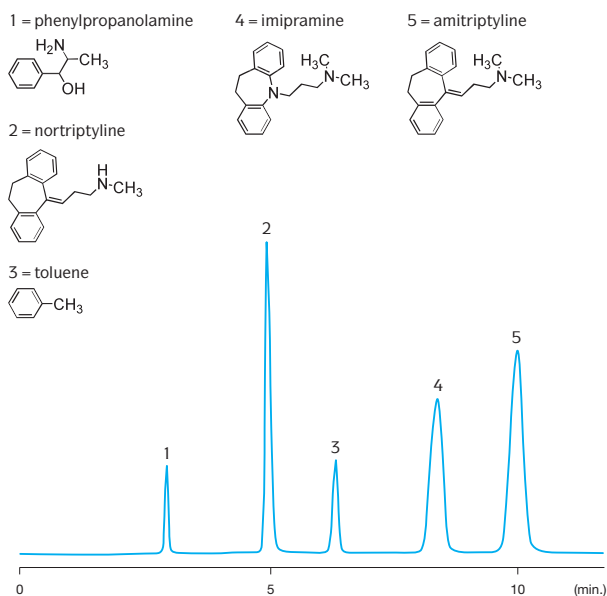
QC test of Kromasil C4. (ref. 349)



Phase: Kromasil 100 Å, 5 µm, C4  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:KH<sub>2</sub>PO<sub>4</sub> 25 mM pH 6.0 (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 215 nm

## QC test, tricyclic antidepressants

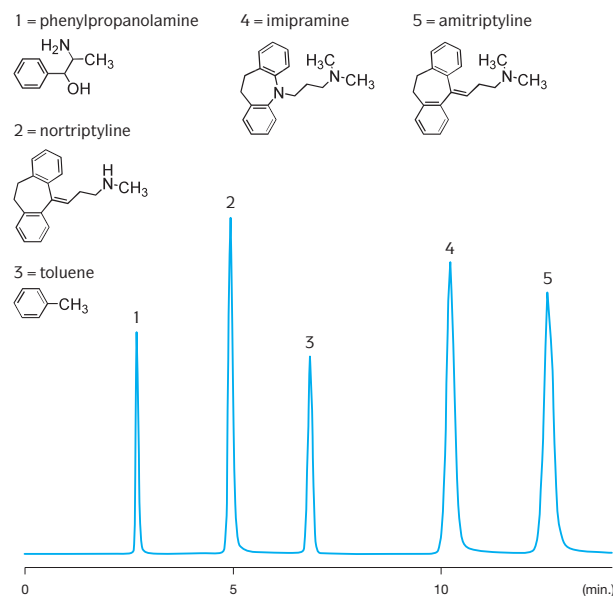
QC test of Kromasil C8. (ref. 350)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:KH<sub>2</sub>PO<sub>4</sub> 25 mM pH 6.0 (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 215 nm

## QC test, tricyclic antidepressants

QC test of Kromasil C18. (ref. 351)

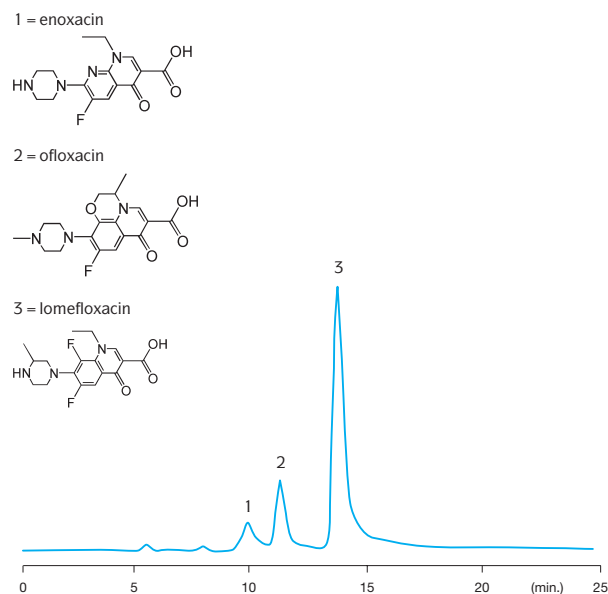


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:KH<sub>2</sub>PO<sub>4</sub> 25 mM pH 6.0 (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 215 nm

# Drugs and metabolites

## Quinolones

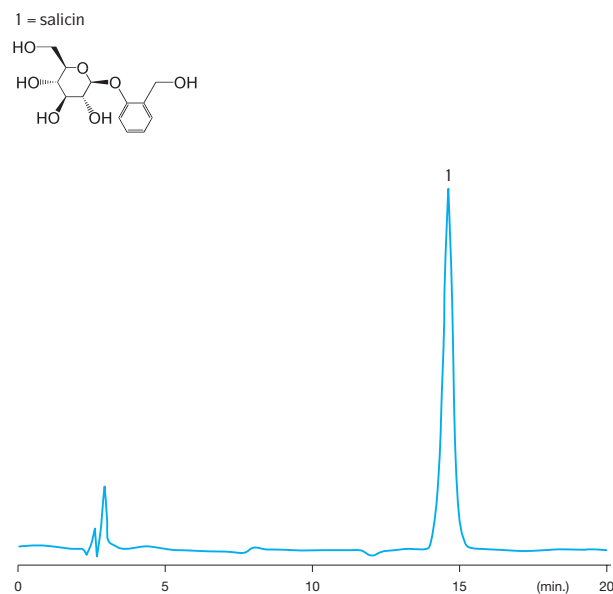
Determination of quinolones in food. (ref. 119)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 3.2 × 250 mm  
 Eluent: oxalic acid (0.01M):ACN:MeOH (6:3:1; v:v:v)  
 Flow rate: 0.5 ml/min.  
 Detection: fluorescence ( $\lambda_{em}$  445 nm,  $\lambda_{ex}$  278 nm)

## Salicin

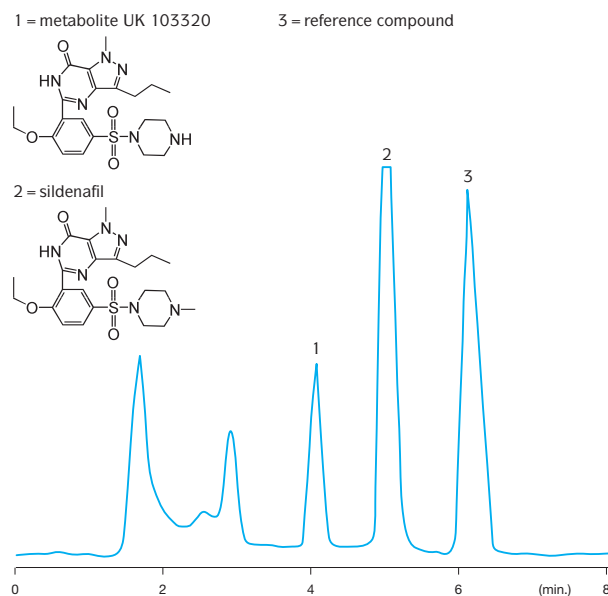
Determination of salicin in extract of willow bark. (ref. 262)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: MeOH:KH<sub>2</sub>PO<sub>4</sub> buffer (pH 4.01, 0.01 M) (15:85; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 265 nm

## Sildenafil

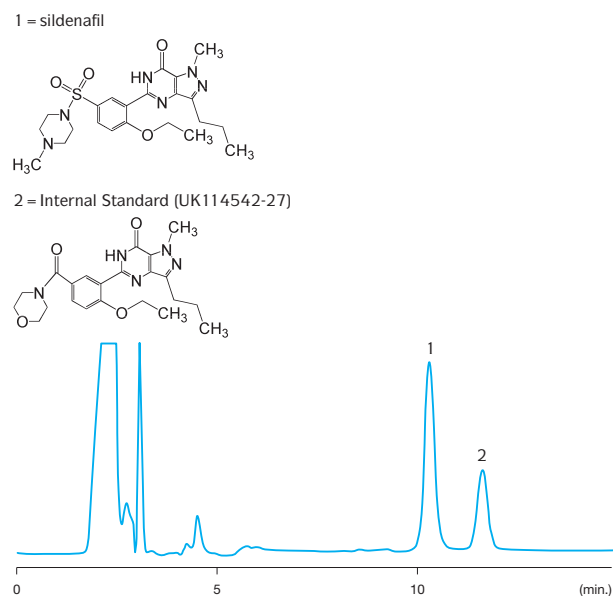
Determination of sildenafil (Viagra) and its metabolite (UK 103320) with ASTED equipment. (ref. 98)



Phase: Kromasil 100 Å, 5 µm, C4  
 Column: 4.6 × 100 mm  
 Temperature: 40 °C  
 Eluent: ACN:potassium phosphate buffer (0.5 M, pH 4.5, containing 10 mM diethylamine HCl):water (28:4:68; v:v:v)  
 Flow rate: 1.5 ml/min.  
 Detection: UV 230 nm

## Sildenafil

Determination of sildenafil citrate (Viagra). (ref. 254)

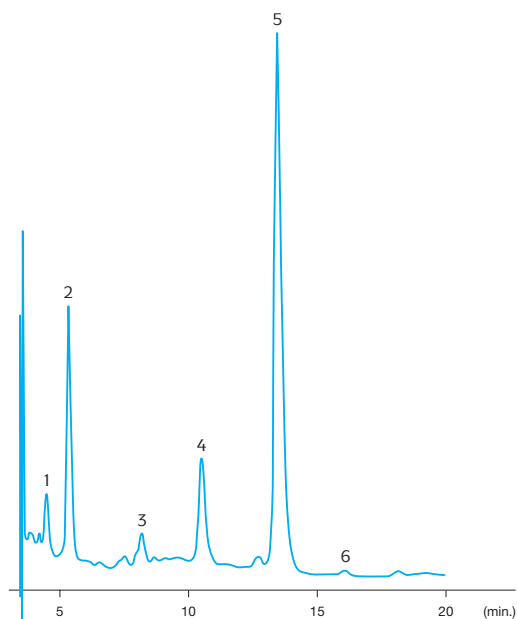


Phase: Kromasil 100 Å, 5 µm, C4  
 Column: 4.6 × 150 mm  
 Temperature: 40 °C  
 Eluent: ACN : 0.5 M potassium phosphate buffer (pH 4.5; containing 10 mM diethylamine HCl) (32:68; v:v)  
 Flow rate: 0.7 ml/min.  
 Detection: UV 230 nm

# Drugs and metabolites

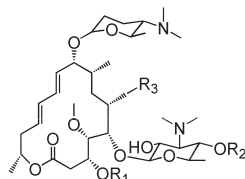
## Spiramycin

Determination of spiramycin in pig liver. (ref. 94)

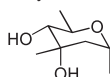


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Temperature: 60 °C  
 Eluent: CH<sub>3</sub>CN:sodium phosphate buffer (0.05 M pH 2.3)  
 (33:67; v:v) + 6 g/l NaClO<sub>4</sub>  
 Flow rate: 1.1 ml/min.  
 Detection: UV 232 nm

1, 2, 3, 4 and 6 = substituted base structure according to table



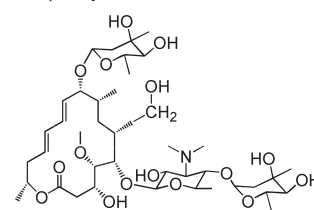
α-mycarose



timonacic



5 = spiramycin S

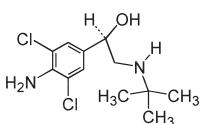


	R1	R2	R3
1. cysteYL neospiramycin I	H	H	timonacic
2. cysteYL spiramycin I	H	α-mycarose	timonacic
3. spiramycin I + cysteYL neospiramycin III	H	α-mycarose	COH
4. cysteYL spiramycin III	COCH <sub>2</sub> CH <sub>3</sub>	H	timonacic
5. spiramycin S	COCH <sub>2</sub> CH <sub>3</sub>	α-mycarose	timonacic
6. spiramycin III	COCH <sub>2</sub> CH <sub>3</sub>	α-mycarose	COH

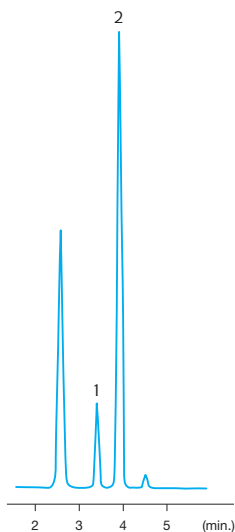
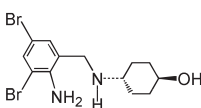
## Steroids

Analysis of clenbuterol hydrochloride and ambroxol hydrochloride. (ref. 331)

1 = clenbuterol



2 = ambroxol

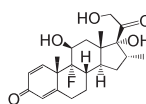


Phase: Kromasil 60 Å, 10 µm, CN  
 Column: 4.6 × 250 mm  
 Eluent: 1.8 g sodium decanesulphate + 3 g potassium phosphate monobasic + 600 ml water (pH 3.0) + 200 ml ACN + 200 ml MeOH  
 Flow rate: 1.5 ml/min.  
 Detection: UV 215 nm

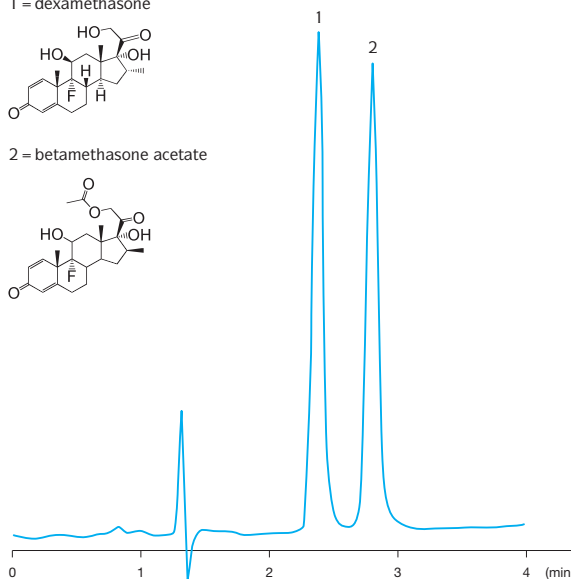
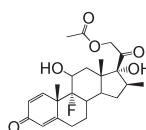
## Steroids

Analysis of dexamethasone and betamethasone acetate in bovine liver. (ref. 272a)

1 = dexamethasone



2 = betamethasone acetate

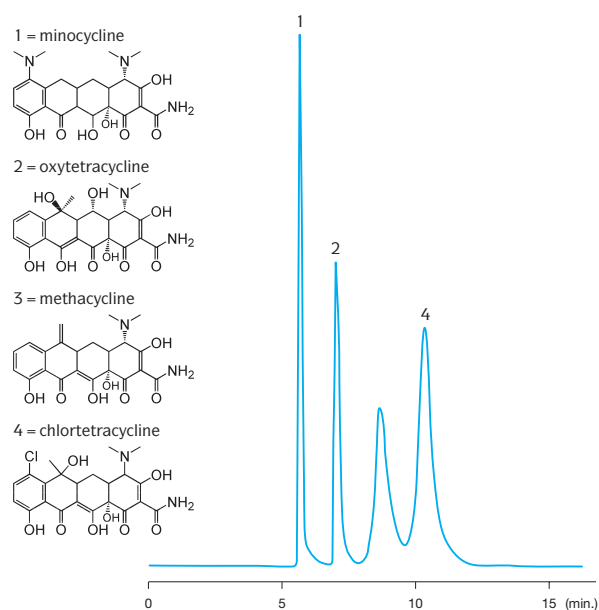


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 150 mm  
 Eluent: MeOH:water (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 240 nm

## Drugs and metabolites

### Tetracyclines

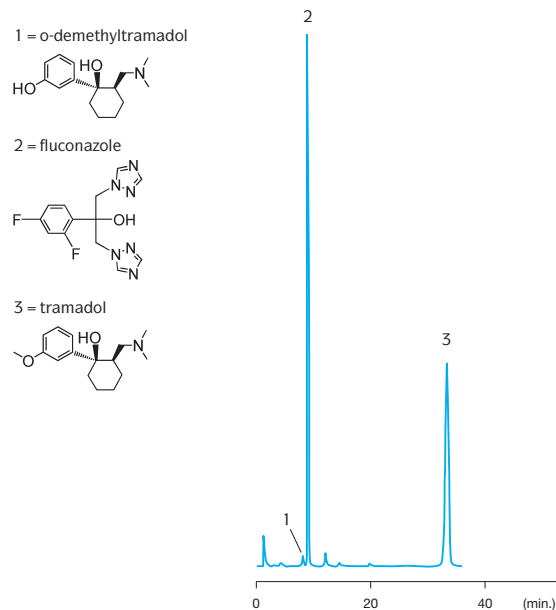
Determination of tetracyclines as chelates with aluminum(III). (ref. 273)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: ACN:DMF:0.05 M citric acid-sodium citrate buffer (pH 2.5) (5:20:75; v:v:v)  
 Flow rate: 0.7 ml/min.  
 Detection: fluorescence ( $\lambda_{\text{ex}}$  380 nm and  $\lambda_{\text{em}}$  480 nm)

### Tramadol

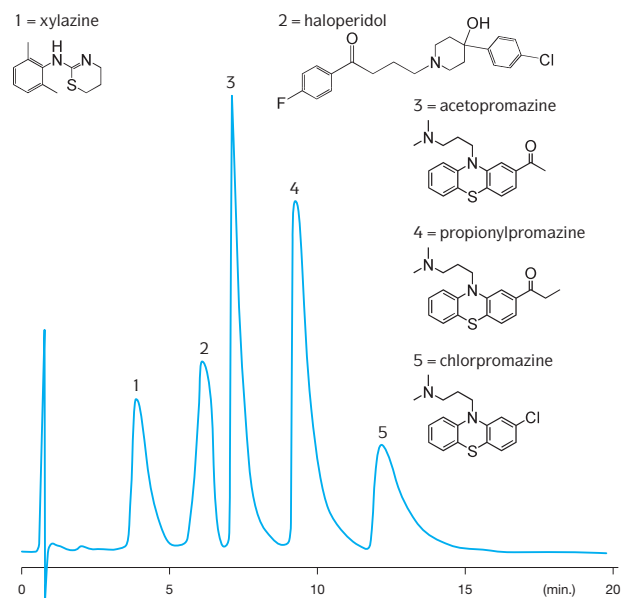
Determination of tramadol and its active metabolite in human plasma. (ref. 130)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 250 mm  
 Temperature: 30 °C ± 3 °C  
 Eluent: acetonitrile:water (19:81, v:v) cont. 0.06 M NaH<sub>2</sub>PO<sub>4</sub> and 0.05 M triethylamine, adjusted to pH 7.90  
 Flow rate: 1 ml/min.  
 Detection: fluorescence ( $\lambda_{\text{ex}}$  207 nm and  $\lambda_{\text{em}}$  300 nm)

### Tranquilizers, veterinary

Analysis of xylazine, haloperidol, acetopromazine, propionylpromazine and chlorpromazine in bovine liver. (ref. 272b)

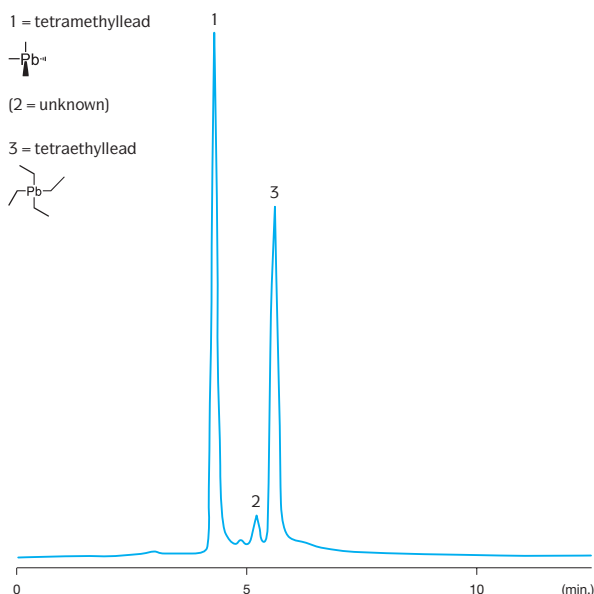


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 150 mm  
 Eluent: MeOH:water (80:20; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 240 nm

# Environmental

## Alkyllead

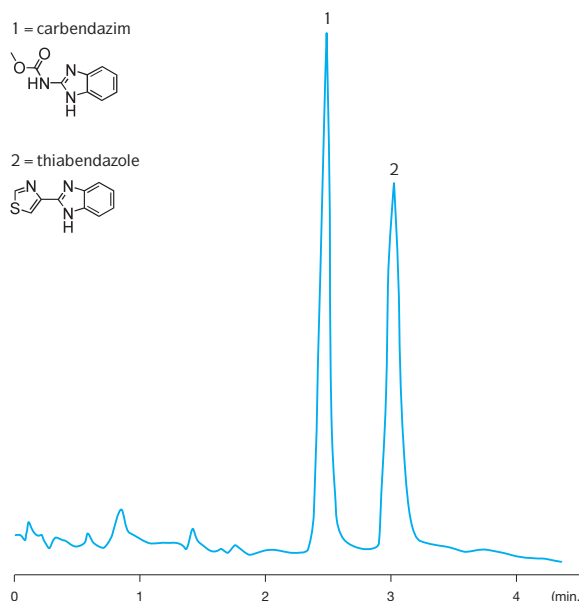
Determination of tetramethyllead and tetraethyllead. (ref. 198)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.32 × 230 mm  
 Temperature: start: 50°C, ramp: 16°C/min., hold: 100°C  
 Eluent: ACN  
 Flow rate: 10 µl/min  
 Detection: ICP-MS

## Benzimidazole fungicides

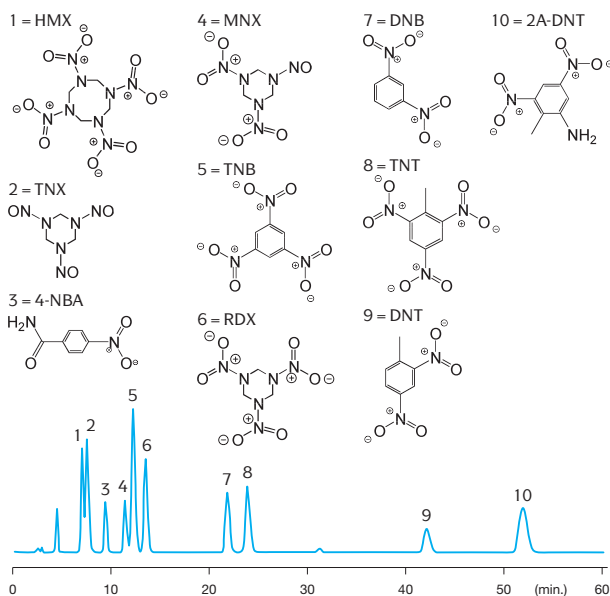
Determination of benzimidazole fungicides in fruits. (ref. 112)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 150 mm  
 Temperature: 55°C  
 Eluent: MeOH-water (50:50; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 285 nm

## Explosives

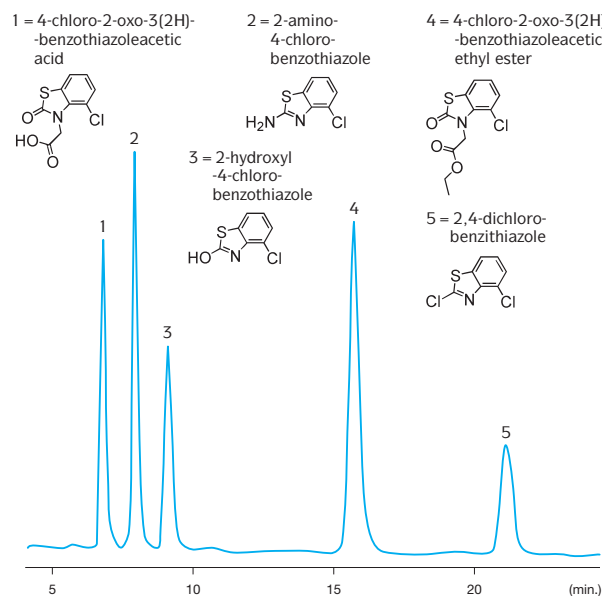
Sensitive determination of RDX, nitroso-RDX metabolites and other munitions in ground water. (ref. 175)



Phase: Kromasil 100 Å, C8  
 Column: 2 × 250 mm  
 Temperature: 32°C  
 Eluent: isopropanol:water:0.5 M ammonium formate (pH 8 adjusted by ammonium hydroxide) (20:78:2; v:v:v)  
 Flow rate: 0.2 ml/min.  
 Detection: UV

## Herbicides

Analysis of 4-chloro-2-oxo-3(2H)-benzothiazoleacetic ethyl ester and related compounds. (ref. 286)

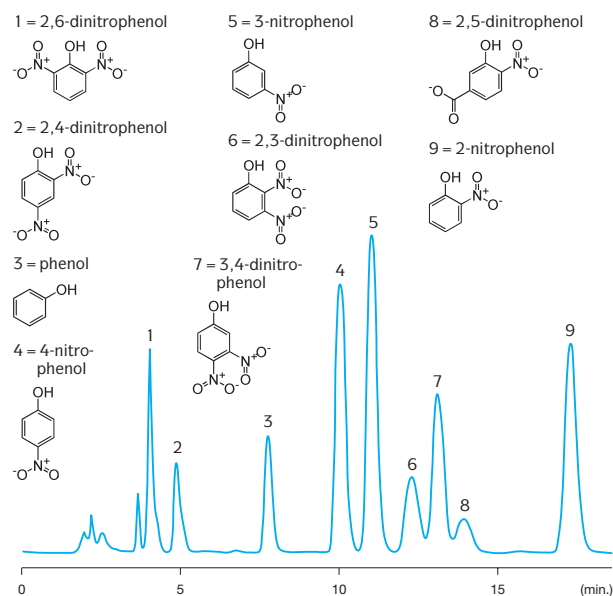


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Temperature: 30°C  
 Eluent: MeOH:water:HAc (60:40:1; v:v:v)  
 Flow rate: 0.7 ml/min.  
 Detection: UV 254 nm

## Environmental

### Nitrophenols

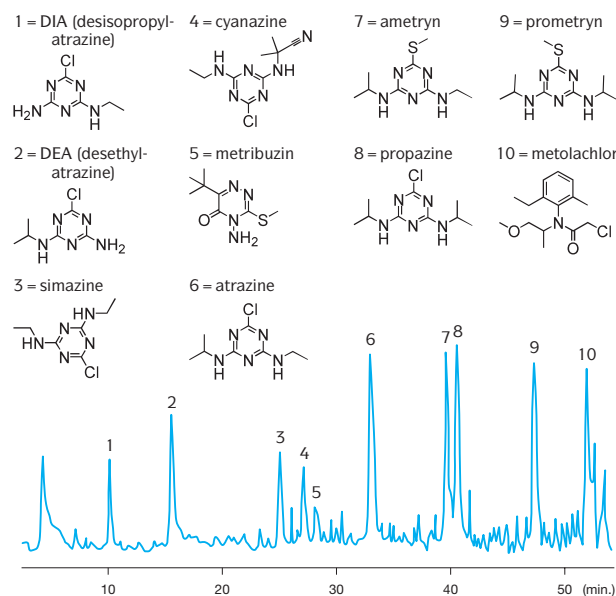
Determination of toxic nitrophenols in the atmosphere. (ref. 183)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.4 × 250 mm  
 Eluent: A:B (55:45; v:v) A: 0.005 M KH<sub>2</sub>PO<sub>4</sub> (pH 4.5 with H<sub>3</sub>PO<sub>4</sub>):ACN (90:10; v:v) B: 0.005 M KH<sub>2</sub>PO<sub>4</sub> (pH 4.5 with H<sub>3</sub>PO<sub>4</sub>):MeOH (25:75; v:v)  
 Flow rate: 1 ml/min.  
 Detection: 230 nm

### Organonitrogen pesticides

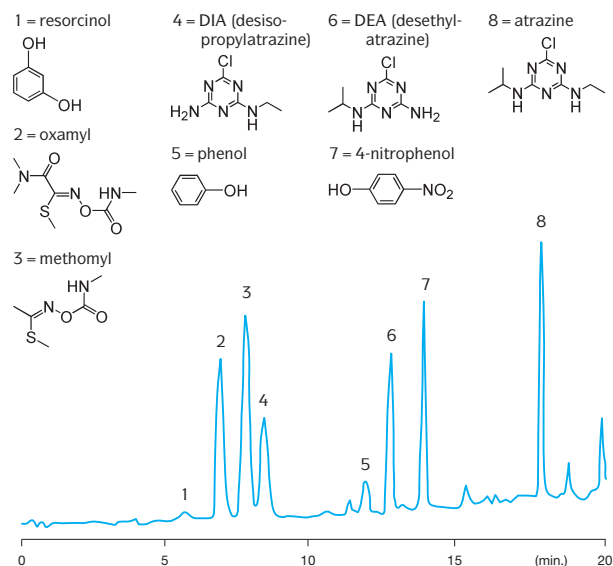
Determination of organonitrogen pesticides in large volumes of surface water. (ref. 132)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: Gradient, ACN:water, 15 – 60% ACN for 50 min, 60% for 15 min  
 Flow rate: 1 ml/min.  
 Detection: APCI-MS

### Pesticides and metabolites

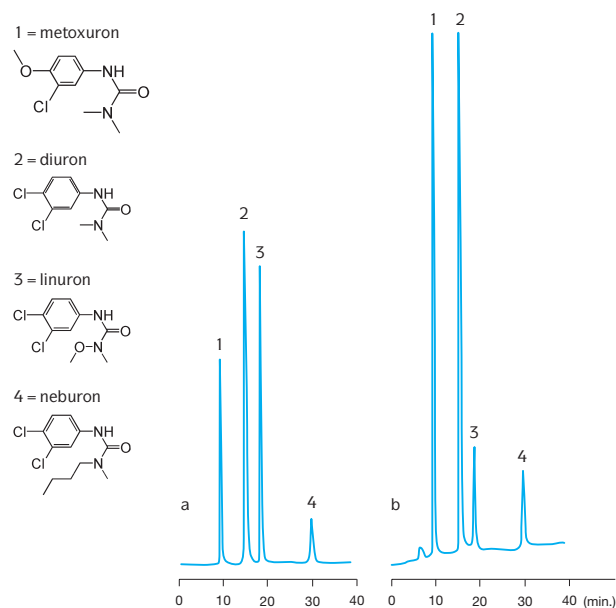
Analysis of polar phenolic compounds, pesticides and metabolites in water. (ref. 167)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 65 °C  
 Eluent: ACN:water (pH 3 adjusted with sulfuric acid)  
 Gradient: From 15 to 25% ACN in 9.3 min., to 50% ACN in 4.3 min., to 100% ACN in 6 min. and then 2 min. isocratic elution at 100% ACN.  
 Flow rate: 1 ml/min.  
 Detection: UV 280 or 240 nm

### Phenylurea herbicides

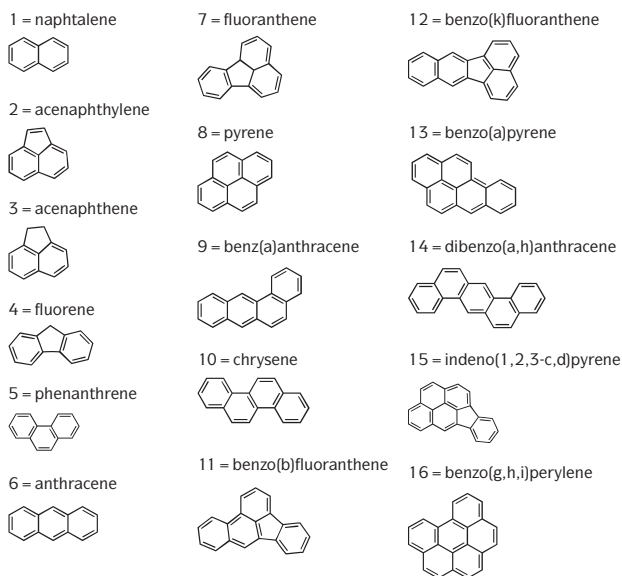
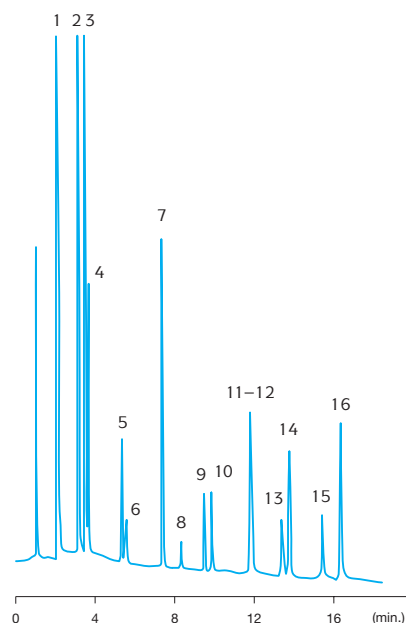
Determination of phenylurea herbicides in water. (ref. 32)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 1 × 300 mm  
 Eluent: MeOH:water (75:25; v:v) in 0.01 M lithium perchlorate at pH 5.5 (adjusted with 1% phosphoric acid)  
 Flow rate: 20 – 40 µl/min  
 Detection: UV 254 nm and electrochemical (potential 1,35 V) respectively for the figures

### Polycyclic aromatic hydrocarbons

Analysis of polycyclic aromatic hydrocarbons. (ref. 184)

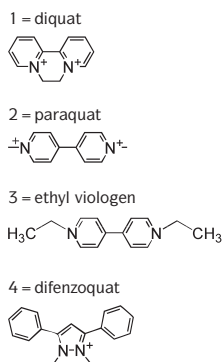
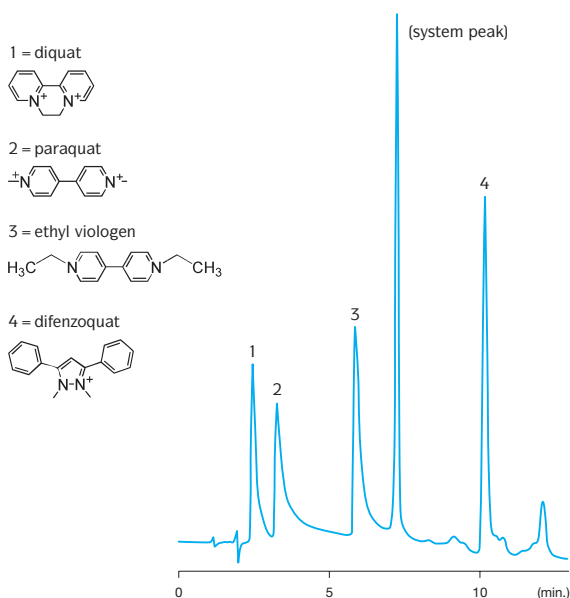


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 40 °C  
 Eluent: CO<sub>2</sub>:ACN  
 Gradient: 0 min. 100% CO<sub>2</sub>, 20 min. 60% CO<sub>2</sub>,  
 25 min. 60% CO<sub>2</sub>

Flow rate: 3 ml/min.  
 Detection: UV 210 nm

### Quaternary ammonium herbicides

Determination of quaternary ammonium herbicides. (ref. 201)

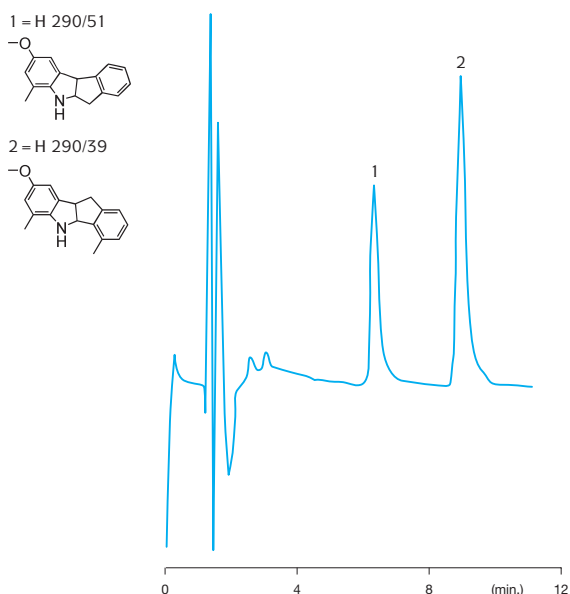


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 2.1 × 200 mm  
 Temperature: 50 °C  
 Eluent: Pentafluoropropionic acid in water (15 mM, pH 3.3) : ACN  
 Gradient: 0 min. 2% ACN, 5 min. 8.6% ACN, 5.01 min. 40%  
 ACN, 13 min. 40% ACN  
 Flow rate: 200 µl/min.  
 Detection: UV

# Food and nutrition

## Antioxidants, lipophilic

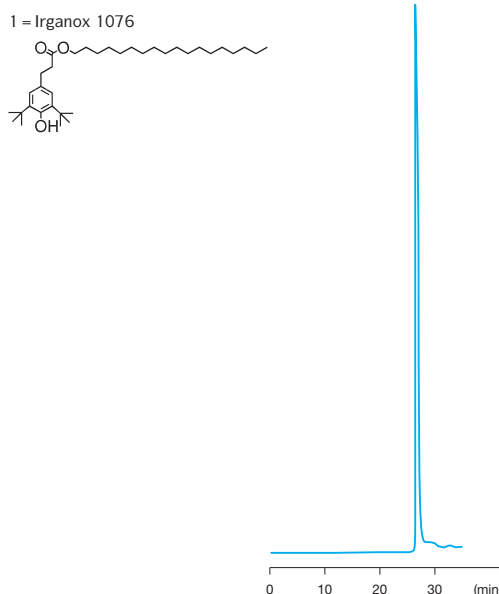
Determination of lipophilic antioxidants in plasma. (ref. 53)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 150 mm  
 Eluent: Tris (50 mM), HCl (12 mM) and 65% ACN (pH 8.5)  
 Flow rate: 1 ml/min.  
 Detection: electrochemical, potential +0.70 V

## Irganox

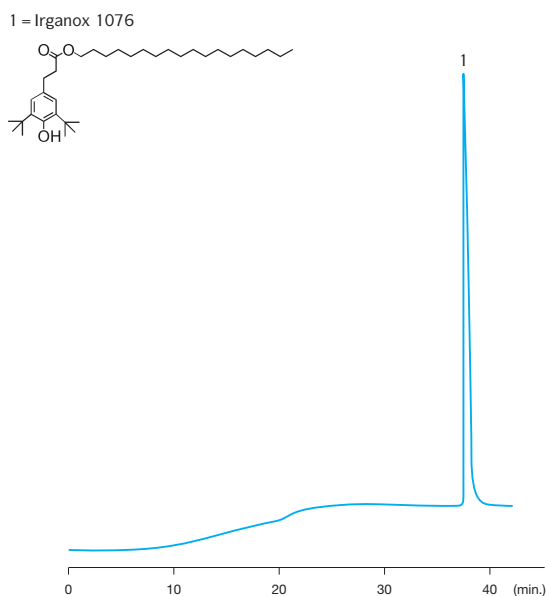
Determination of Irganox (an antioxidant). (ref. 20)



Phase: Kromasil 100 Å, 3.5 µm, C18  
 Column: 0.25 × 250 mm  
 Temperature: gradient: 5 °C/min. from 5 to 40 °C, 2 °C/min. from 40 to 80 °C, 5 °C/min. from 80 to 90 °C  
 Eluent: ACN + 10mM TEA + HCOOH  
 Flow rate: 5 µl/min.  
 Detection: ELS

## Irganox

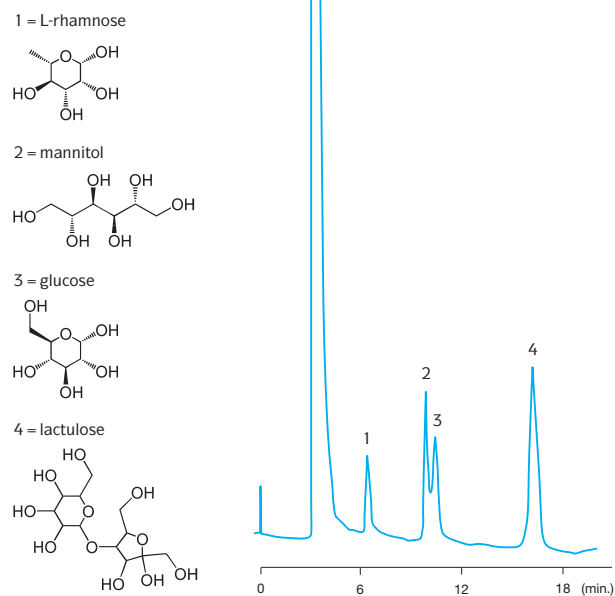
Determination of Irganox. (ref. 208)



Phase: Kromasil 100 Å, 5 µm, C18  
 Temperature: from 7 to 90 °C at 3 °C/min.  
 Column: 0.32 × 500 mm  
 Eluent: ACN  
 Flow rate: 5 µl/min  
 Detection: UV 280 nm

## Sugars

Analysis of sugars in urine. (ref. 82)

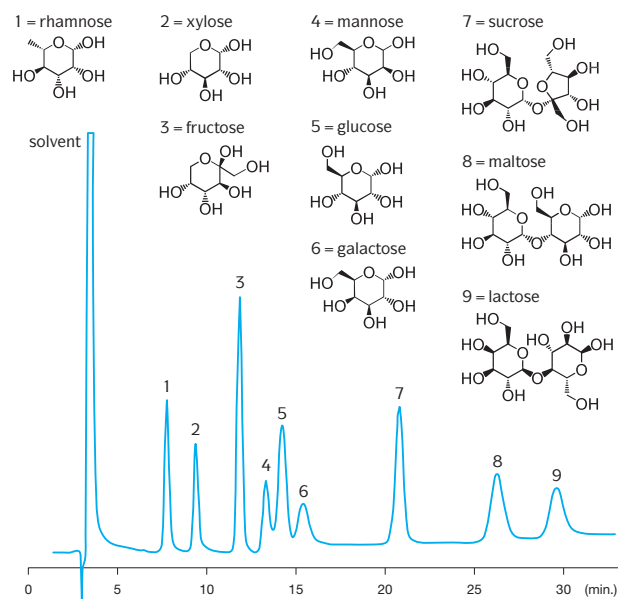


Phase: Kromasil 100 Å, 5 µm, NH<sub>2</sub>  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: ACN:water (70:30; v:v)  
 Flow rate: 1 ml/min.  
 Detection: refractive index

# Food and nutrition

## Sugars

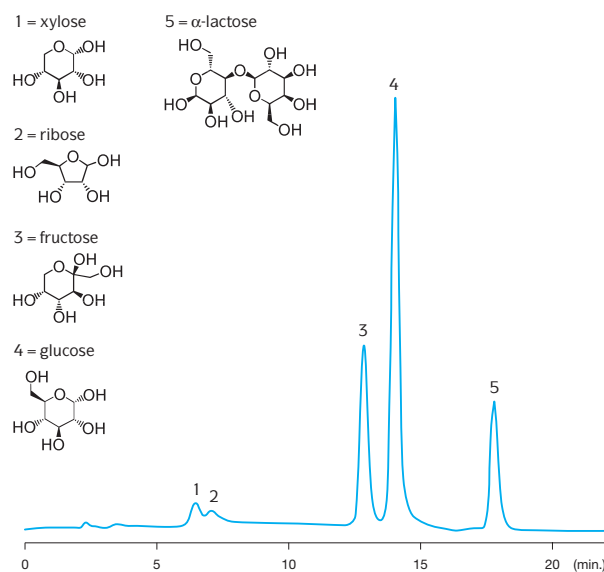
Analysis of sugars. (ref. 315)



Phase: Kromasil 100 Å, 5 µm, NH<sub>2</sub>  
 Column: 4.6 × 250 mm  
 Eluent: ACN:water (75:25; v:v)  
 Flow rate: 1 ml/min.  
 Detection: RI

## Sugars, phosphorylated

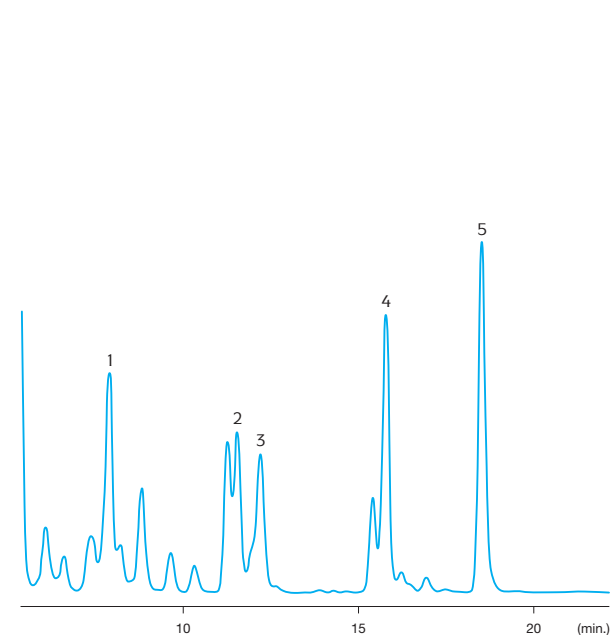
Determination of reducing sugars in beef sirloin, with post-column reduction. (ref. 27)



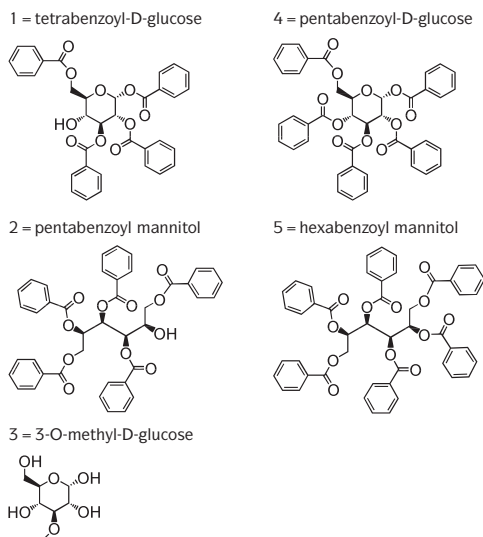
Phase: Kromasil 100 Å, 5 µm, NH<sub>2</sub>  
 Column: 4 × 250 mm  
 Eluent: ACN:water (85:15; v:v) at pH 4.8  
 Flow rate: 1.4 ml/min.  
 Post column: Post-column reduction at 95 °C with tetrazolium blue (0.7 mM in distilled water and 0.16 M NaOH, 15% EtOH, 0.047M Na-K-tartrate, pH 12.7) before detection.  
 Detection: 550 nm

## Sugars and polyols, benzoylated

Analysis of benzoylated sugars and polyols. (ref. 51b)



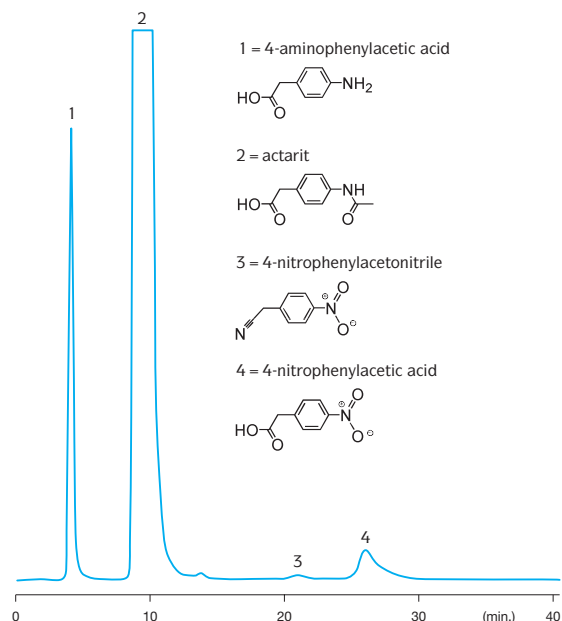
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 250 mm  
 Eluent: Gradient, ACN-water, 0 min. 70% ACN, 30 min. 95% ACN  
 Flow rate: 1 ml/min.  
 Detection: UV 228 nm



# Natural products

## Actarit

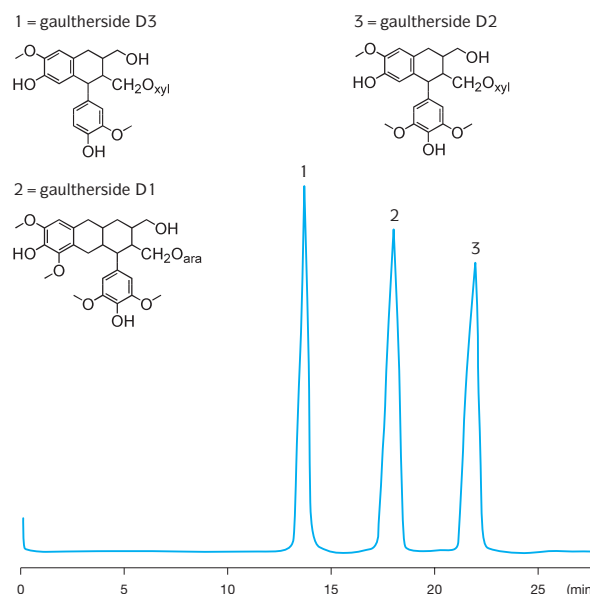
Determination of actarit and related compounds. (ref. 274)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: MeOH:water (70:30; v:v) + 1% tetrabutylammonium bromide  
 Flow rate: 1 ml/min.  
 Detection: UV 245 nm

## Gaulthersides

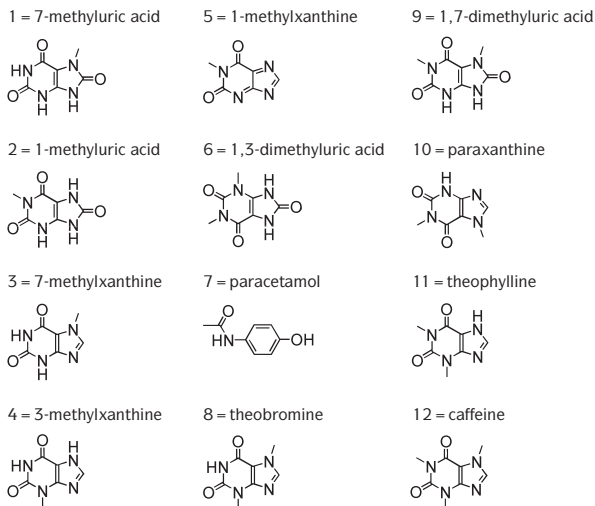
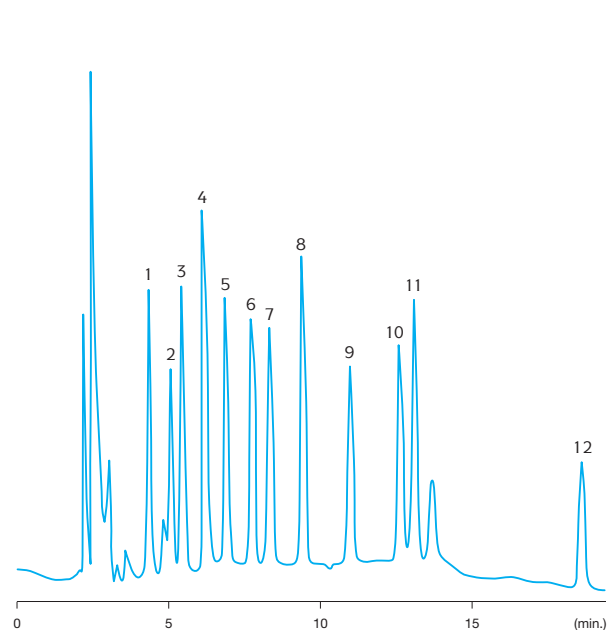
Determination of Gaulthersides in Yunnan wintergreen. (ref. 307)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 3.9 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:ACN:water (25:5:70; v:v:v) pH=3.5 (adjusted with H<sub>3</sub>PO<sub>4</sub>)  
 Flow rate: 0.7 ml/min.  
 Detection: UV 220 nm

## Caffeine and metabolites

Quantitation of caffeine metabolism products. (ref. 271)



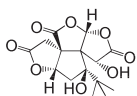
Phase: Kromasil 100 Å, 5 µm, C4  
 Column: 4 × 250 mm  
 Temperature: ambient  
 Eluent: acetate buffer (pH 3.5) : MeOH (97:3; v:v)  
 Gradient: 0 min. 3% MeOH, 20 min. 20% MeOH  
 Flow rate: 1 ml/min.  
 Detection: UV 275 nm

# Natural products

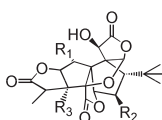
## Ginkgolides

Determination of ginkgolides. (ref. 277)

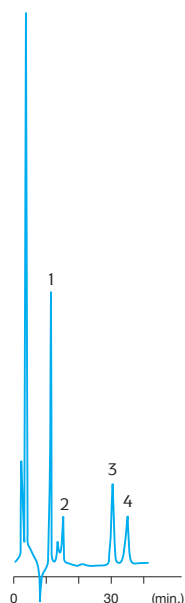
1 = bilobalide



2 - 4 = ginkgolide



	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>
2. ginkgolide C	OH	OH	OH
3. ginkgolide A	H	H	OH
4. ginkgolide B	OH	H	OH

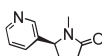


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: water:MeOH (77:33; v:v)  
 Flow rate: 1 ml/min.  
 Detection: refractive index

## Nicotine

Clinical assay of nicotine and its metabolite, cotinine, in body fluids. (ref. 306)

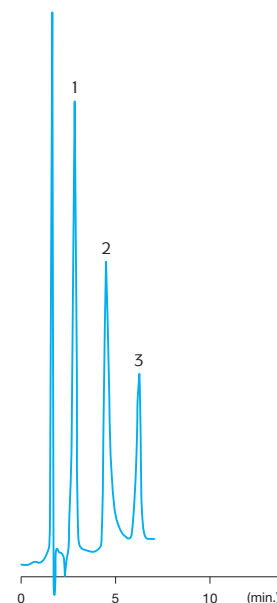
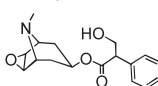
1 = cotinine



2 = nicotine



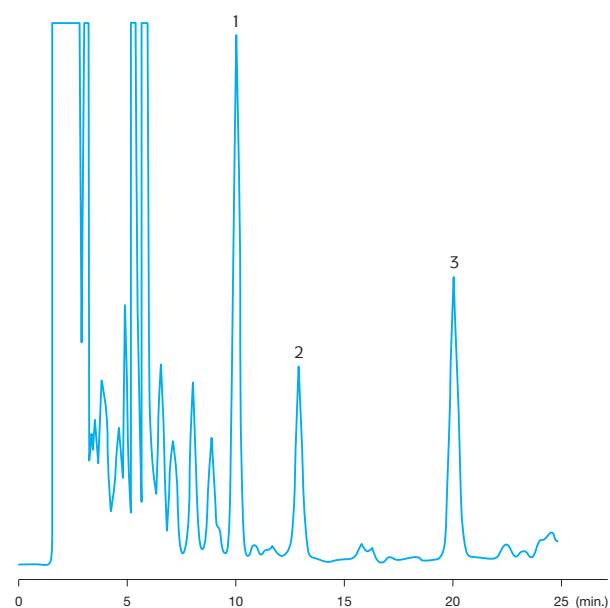
3 = scopolamine



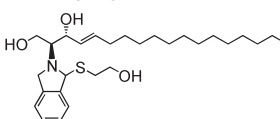
Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4 × 250 mm  
 Temperature: ambient, 22 °C  
 Eluent: ammonium acetate (0.05 M):CH<sub>3</sub>OH (60:40; v:v)  
 Flow rate: 1.4 ml/min.  
 Detection: UV 262 nm

## Sphingoids

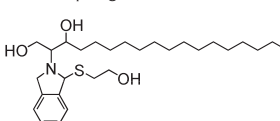
Analysis of sphinganine and sphingosine from urine with precolumn o-phthaldialdehyde (OPA) derivatization. (ref. 87)



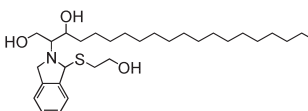
1 = OPA-sphingosine



2 = OPA-sphinganine



3 = OPA-C20-sphinganine



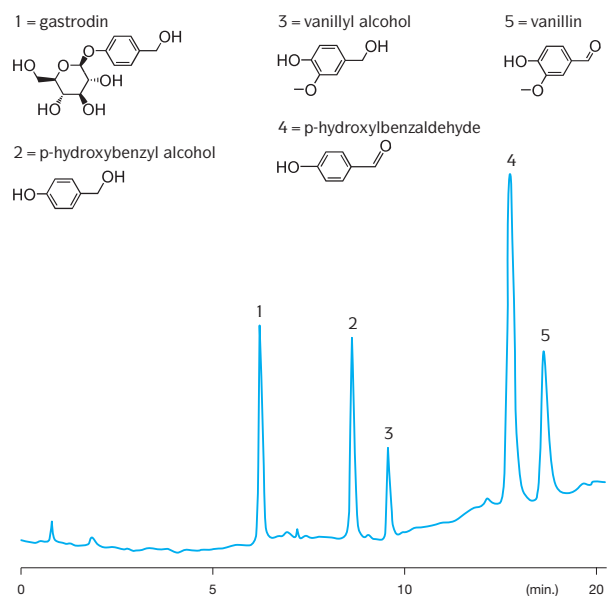
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 45 °C  
 Eluent A: 0.07 M K<sub>2</sub>HPO<sub>4</sub> in MeOH (1:9; v:v)  
 Eluent B: MeOH  
 Gradient: 0 min. 0% B, 10 min. 0% B, 30 min. 40% B, 32 min. 100% B, 42 min. 100% B, 44 min. 0% B, 60 min. 0% B

Flow rate: 1.3 ml/min.  
 Detection: fluorescence (λ<sub>ex</sub> 340 nm, λ<sub>em</sub> 455 nm)

## Natural products

### TCM, Traditional Chinese Medicine

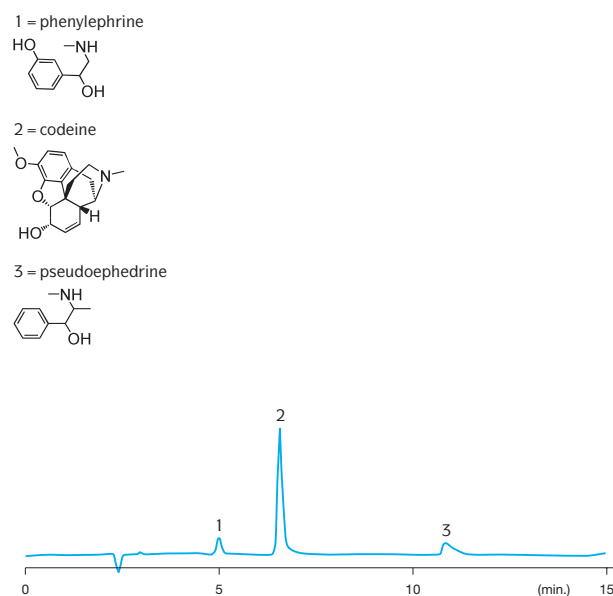
Determination of gastrodin, p-hydroxybenzyl alcohol, vanillyl alcohol, p-hydroxybenzaldehyde and vanillin from TCM. (ref. 297)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Temperature: ambient  
 Eluents: Eluent A: water, eluent B: MeOH  
 Gradient: 0 min 5% B, 9 min 44% B, 12 min 65% B, 15 min 65% B  
 Flow rate: 1 ml/min.  
 Detection: UV 270 nm

### TCM, Traditional Chinese Medicine

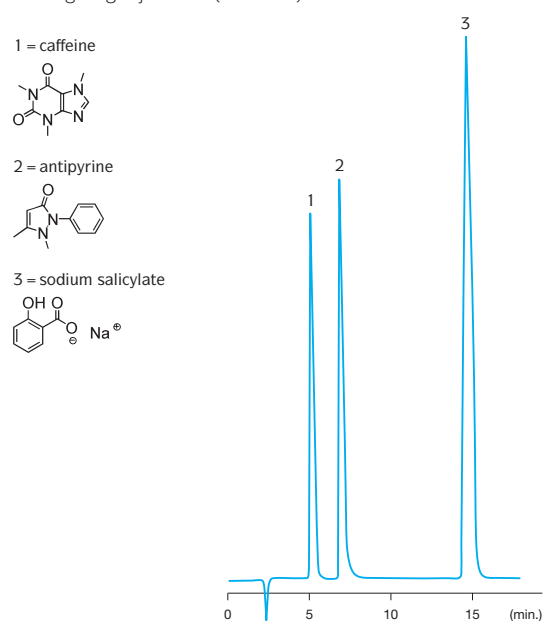
Determination of three components in a Chinese doctor-cough syrup. (ref. 210)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 45 °C  
 Eluent: MeOH:water:acetic acid (40:60:2; v:v:v) + 5 mM IPR-B<sub>8</sub>  
 Flow rate: 1 ml/min.  
 Detection: UV 245 nm

### TCM, Traditional Chinese Medicine

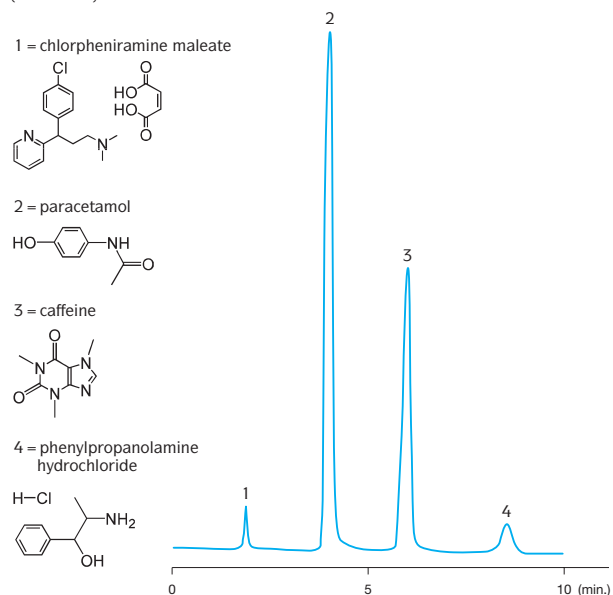
Analysis of caffeine, antipyrine and sodium salicylate in Satongfeng injection. (ref. 215)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: 20 mM potassium dihydrogen phosphate: MeOH:glacial acetic acid (55:25:0.4; v:v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 242 nm

### TCM, Traditional Chinese Medicine

Determination of four components of Ganmaoling capsules. (ref. 258)



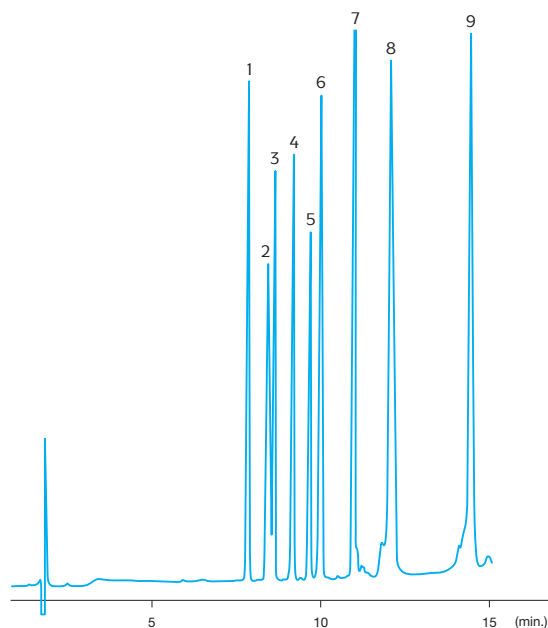
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 30 °C  
 Eluent: ACN:diammonium hydrogen phosphate (pH 3.1, 0.03 M) (12:88; v:v) containing 0.75 – 5 mM sodium sulfonic heptane  
 Flow rate: 1 ml/min.  
 Detection: UV 214 nm



# Peptides

## Peptides

Separation of 9 peptides. (ref. 316)



- 1 = oxytocin  
Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH2  
 S-----S
- 2 = bradykinin  
Arg-Pro-Pro-Gly-Phe-Ser-Pro-Phe-Arg
- 3 = methionine enkephalin  
Tyr-Gly-Gly-Phe-Met
- 4 = angiotensin II  
Asp-Arg-Val-Tyr-Ile-His-Pro-Phe
- 5 = leucin enkephalin  
Tyr-Gly-Gly-Phe-Leu
- 6 = angiotensin I  
Asp-Arg-Val-Tyr-Ile-His-Pro-Phe-His-Leu
- 7 = insulin
- 8 = lysosyme
- 9 = melittine  
Gly-Ile-Gly-Ala-Val-Leu-Lys-Val-Leu-Thr-Thr-Gly-Leu-Pro-Ala-Leu-Ile-Ser-Trp-Ile-Lys-Arg-Lys-Arg-Gln-Gln-NH2

Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.5 × 250 mm  
 Temperature: ambient  
 Eluent A: 0.1% TFA in 10% CH<sub>3</sub>CN and 90% water  
 Eluent B: 0.1% TFA in 90% CH<sub>3</sub>CN and 10% water  
 Gradient: 0 min. 0% B, 8 min. 25% B, 20 min. 75% B

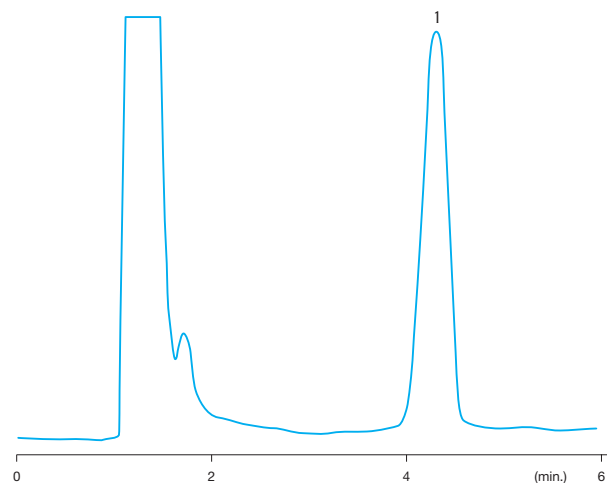
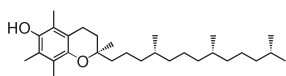
Flow rate: 2 ml/min.  
 Detection: UV 254 nm

# Vitamins

## Vitamin E

Determination of vitamin E in human plasma. (ref. 108)

1 = vitamin E

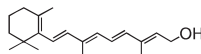


Phase: Kromasil 100 Å, 5 µm, C1  
 Column: 4.6 × 100 mm  
 Temperature: ambient  
 Eluent: MeOH:ACN:water (50:35:15; v:v:v)  
 Flow rate: 1.5 ml/min.  
 Detection: UV 292 nm

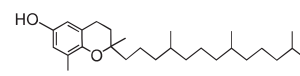
## Vitamins

Determination of tocopherols and vitamin A in vegetable oils. (ref. 188)

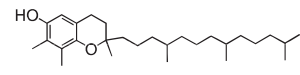
1 = vitamin A (retinol)



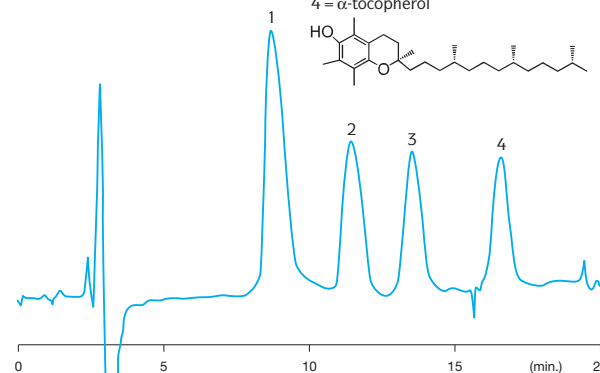
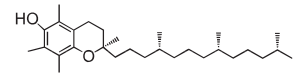
2 = δ-tocopherol



3 = γ-tocopherol



4 = α-tocopherol

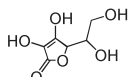


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.2 × 800 mm  
 Temperature: 65 °C  
 Eluent: CO<sub>2</sub> with 8% MeOH  
 Pressure: 180 atm  
 Detection: electrochemical (potential + 1.80 V versus Quasi-Reference Electrode)

## Vitamins

Analysis of soluble vitamins. (ref. 330)

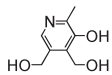
1 = ascorbic acid (vitamin C)



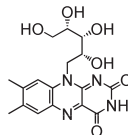
2 = nicotinamide (vitamin B<sub>3</sub>)



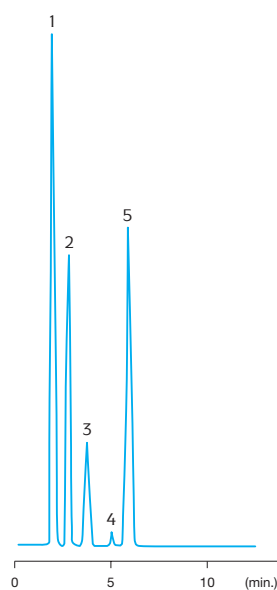
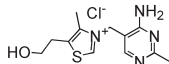
3 = pyridoxine (vitamin B<sub>6</sub>)



4 = riboflavin (vitamin B<sub>2</sub>)



5 = thiamine chloride (vitamin B<sub>1</sub>)

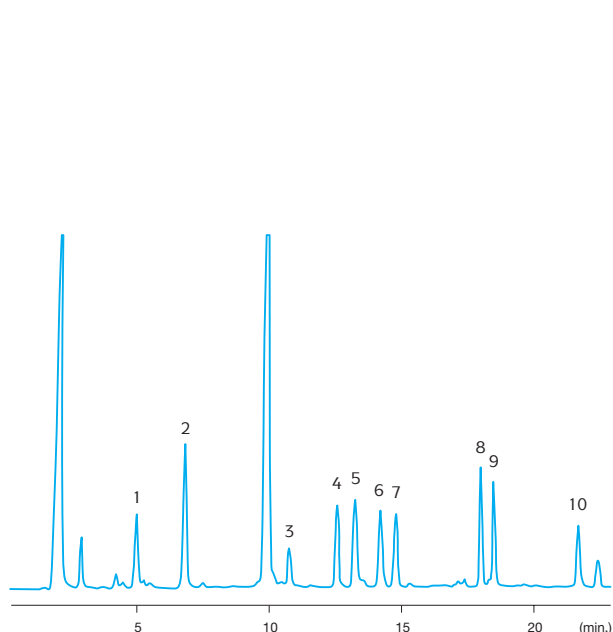


Phase: Kromasil 100 Å, 10 µm, NH<sub>2</sub>  
 Column: 4.6 × 250 mm  
 Eluent: 0.68 g sodium 1-hexanesulfonic acid + 0.8 g phosphoric acid + 720 ml water (pH 2.3) + 80 ml ACN + 200 ml MeOH  
 Flow rate: 1 ml/min.  
 Detection: UV 210 nm

## Other

## Amines

Determination of amines from fish decomposition by dansylchloride derivatisation. (ref. 73)



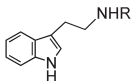
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 25 °C  
 Eluent: ACN:water  
 Gradient: 0 min 60% ACN, 6 min 75% ACN, 8 min 75% ACN, 13 min 95% ACN, 20 min 95% ACN, 20.01 min 60% ACN

1 = NH<sub>3</sub><sup>+</sup>R

2 = methylamine



3 = tryptamine



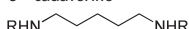
4 = 1,3-diaminopropane



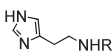
5 = putrescine



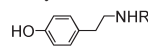
6 = cadaverine



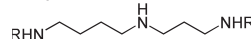
7 = histamine



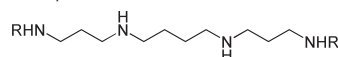
8 = tyramine



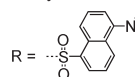
9 = spermidine



10 = spermine



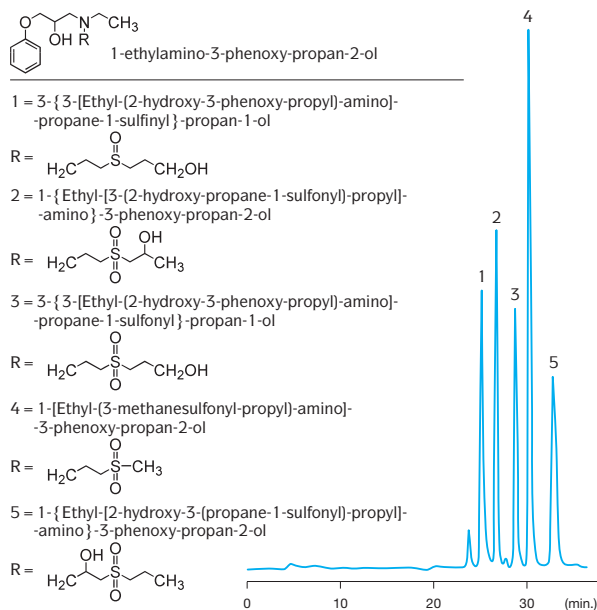
dansyl derivative group



Flow rate: 1 ml/min.  
 Detection: UV 254 nm

## Amino alcohols

Separation of derivates of 1-ethylamino-3-phenoxy-propan-2-ol. (ref. 38)



Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 0.2 × 900 mm  
 Eluent: ACN:ammonium acetate( 5 mM) (55:45; v:v)  
 Flow rate: 0.95 µl/min.  
 Detection: ESI-MS

## Aroma extracts in alcoholic beverages

Separation of aroma extracts found in wine and other alcoholic beverages. (ref. 209)

1 = furfural



2 = sotolon



3 = vanillin



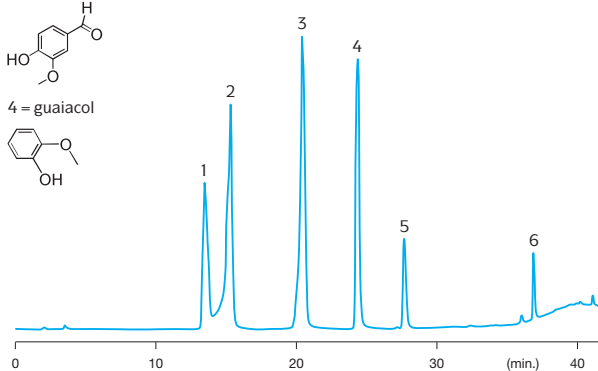
4 = guaiacol



5 = 2-phenylethanol



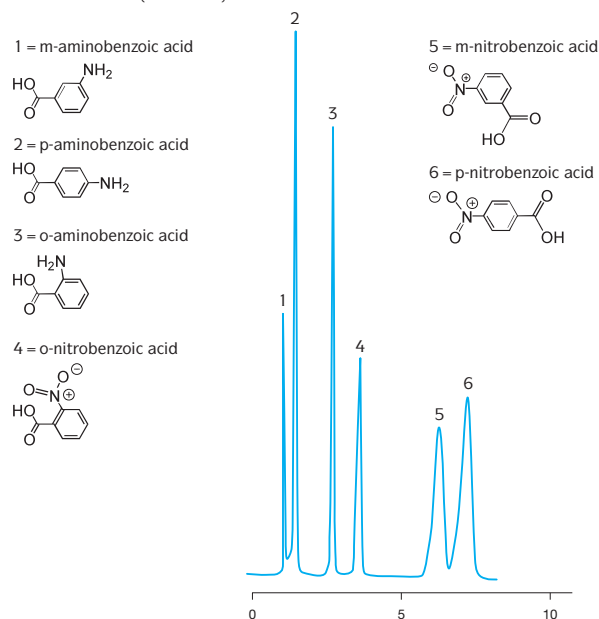
6 = 2-phenylethyl acetat



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 10 × 250 mm  
 Eluent: water:ethanol  
 Gradient: 0 min. 100% water, 8 min. 80% water, 28 min. 50% water, 40 min. 0% water  
 Flow rate: 2 ml/min.  
 Detection: UV 220 nm

**Aromatics**

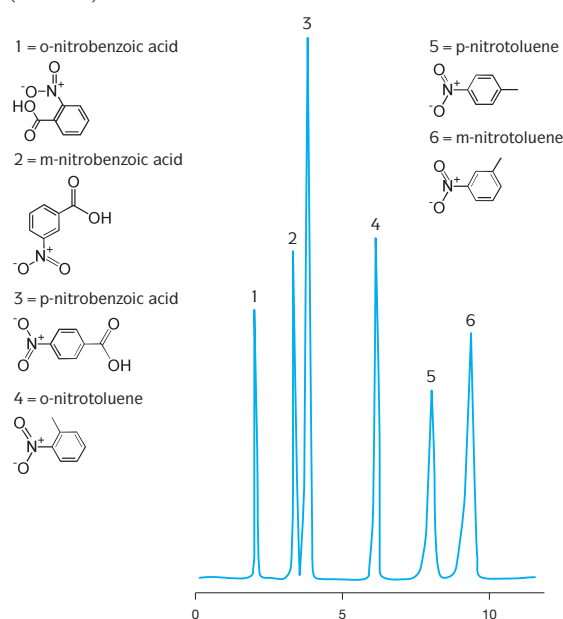
Separation of mixtures of nitrobenzoic acid and aminobenzoic acid isomers. (ref. 214)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Temperature: 35 °C  
 Eluent: MeOH:water:THF (55:44:1; v:v:v) with β-cyclodextrin at pH 3.0  
 Flow rate: 0 – 4 min. 2 ml/min., 4 – 10 min. 2.6 ml/min.  
 Detection: UV 254 nm

**Aromatics**

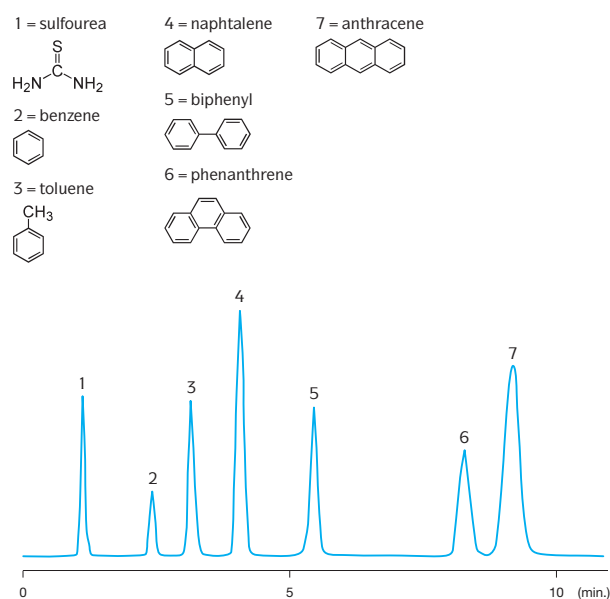
HPLC analysis of isomers of nitrotoluene and nitrobenzoic acid. (ref. 213)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 200 mm  
 Temperature: 35 °C  
 Eluent: MeOH:water:THF (55:44:1; v:v:v) with β-cyclodextrin at pH 3.0  
 Flow rate: 0 – 4 min. 2 ml/min., 4 – 10 min. 2.6 ml/min.  
 Detection: UV 254 nm

**Aromatics**

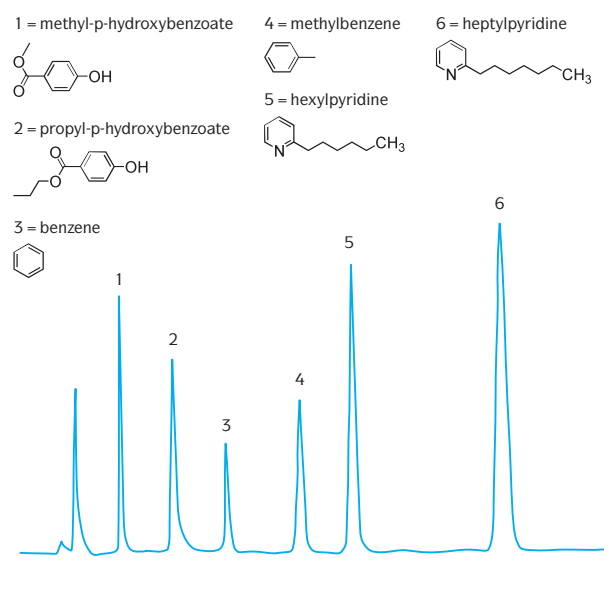
Determination of sulfourea, benzene, toluene, naphtalene, biphenyl, phenanthrene, anthracene. (ref. 301a)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.8 × 150 mm  
 Eluent: MeOH:water (80:20; v:v)  
 Flow rate: 38 µl/min.  
 Detection: UV 254 nm

**Aromatics**

Separation of benzene and pyridine derivatives. (ref. 40)

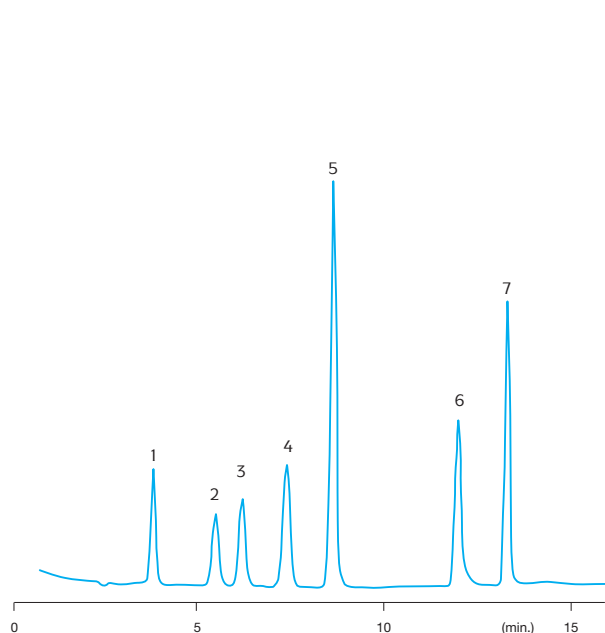


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: ACN:water (56.9:43.1; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 254 nm

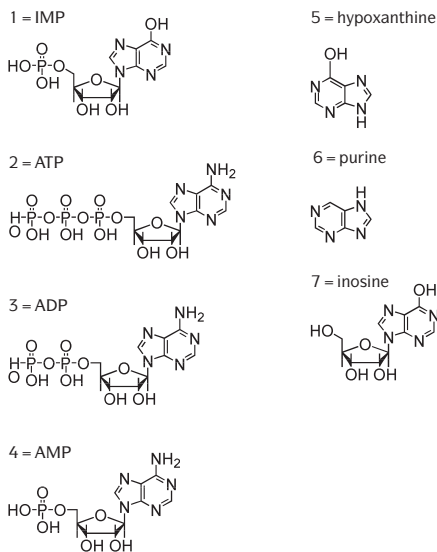
# Other

## ATP degradation products

Determination of ATP degradation products from fish decomposition. (ref. 159)



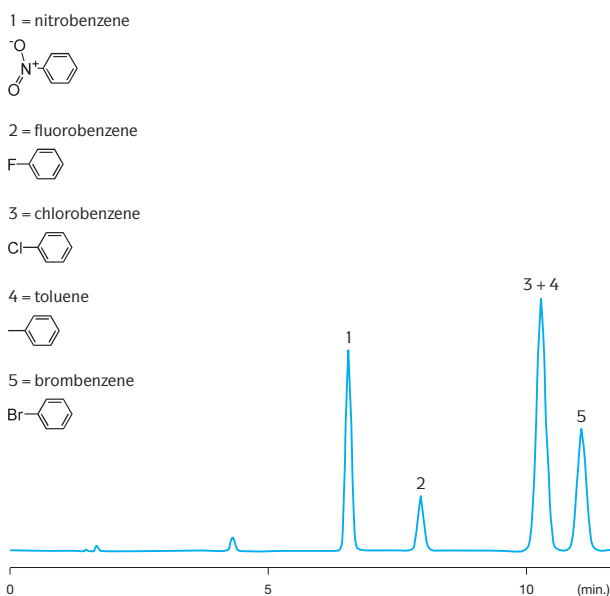
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: 25 °C  
 Eluents: Eluent A, ACN and eluent B, phosphate buffer (pH 7.00, 60 mM K<sub>2</sub>HPO<sub>4</sub> + 40 mM KH<sub>2</sub>PO<sub>4</sub>)



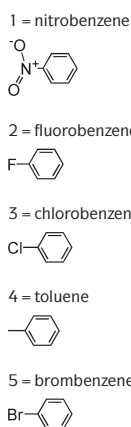
Gradient: 0 min. 100% B, 4 min. 98% B, 5 min. 97% B, 8 min. 96% B, 15 min. 96% B, 15.01 min. 100% B  
 Flow rate: 1 ml/min.  
 Detection: UV 254 nm

## Benzene, substituted

Separation of substituted benzene. (ref. 1)

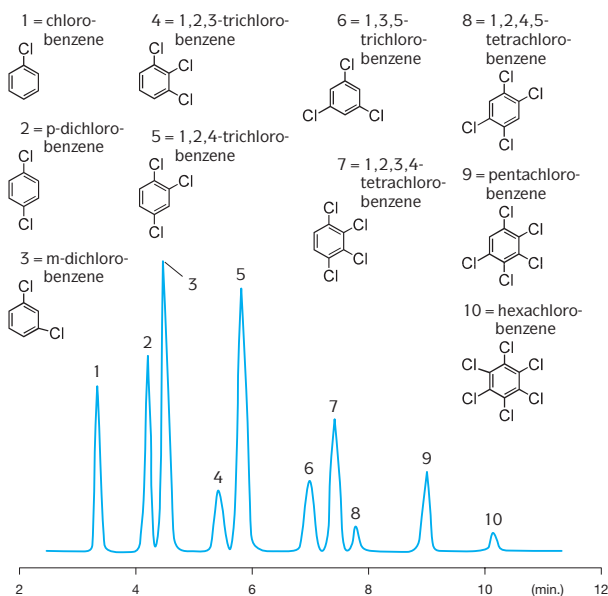


Phase: Kromasil 100 Å, 5 µm, C8  
 Column: 4.6 × 250 mm  
 Temperature: 20 °C  
 Eluent: ACN:water (60:40; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 210 nm

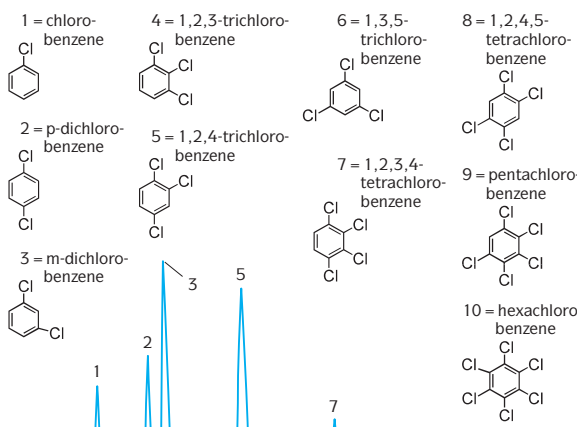


## Chlorinated benzenes

Determination of chlorobenzene and derivatives. (ref. 301c)

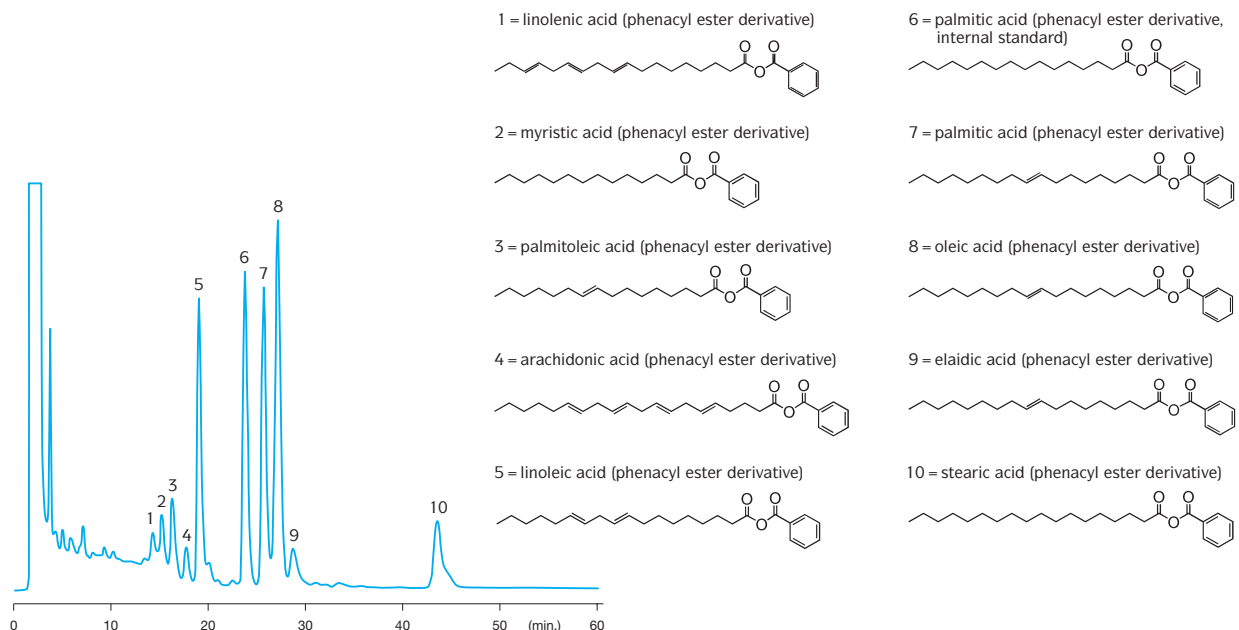


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.8 × 150 mm  
 Eluent: eluent A: ACN, eluent B: water  
 Gradient: 0 min. 80% A, 5 min. 80% A, 10 min. 100% A  
 Flow rate: 32 µl/min.  
 Detection: UV 220 nm



### Fatty acids

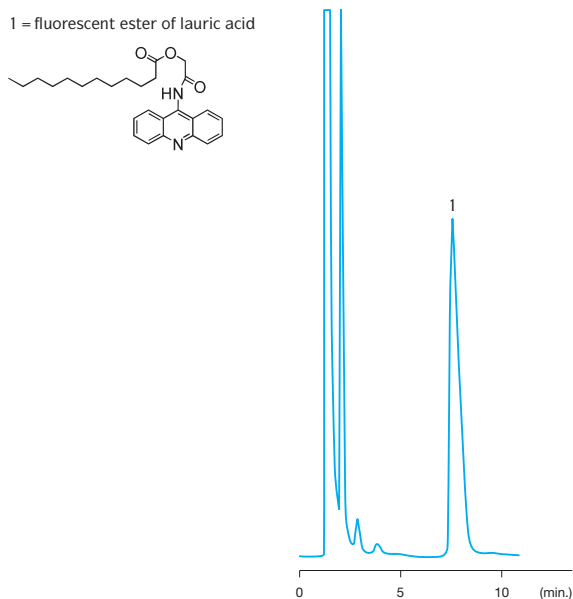
Analysis of plasma fatty acids as their phenacyl esters. (ref. 193)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Temperature: ambient  
 Eluent: MeOH:water (91:9; v:v)  
 Flow rate: 1.15 ml/min.  
 Detection: UV 254 nm

### Lauric acid

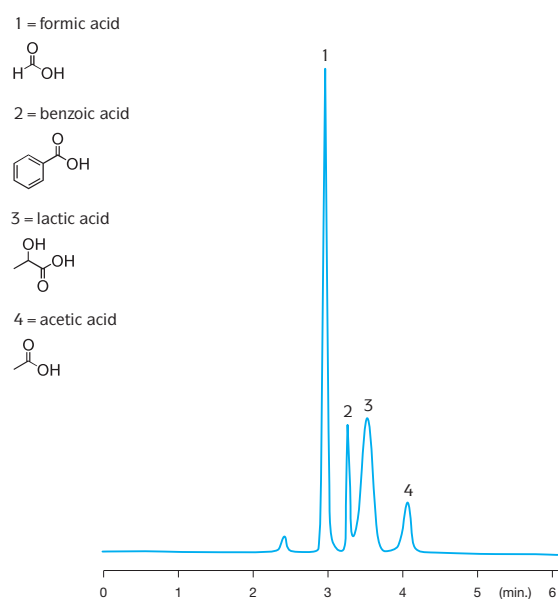
Detection of ester of lauric acid. (ref. 35)



Phase: Kromasil 100 Å, 7 µm, C18  
 Column: 4.6 × 150 mm  
 Eluent: ACN:MeOH:water (55:10:35; v:v:v)  
 0.2% phosphoric acid added  
 Flow rate: 1 ml/min.  
 Detection: fluorescence ( $\lambda_{ex}$  357.5 nm and  $\lambda_{em}$  482 nm)

### Organic acids

Separation of formic acid, benzoic acid, lactic acid, acetic acid. (ref. 344)

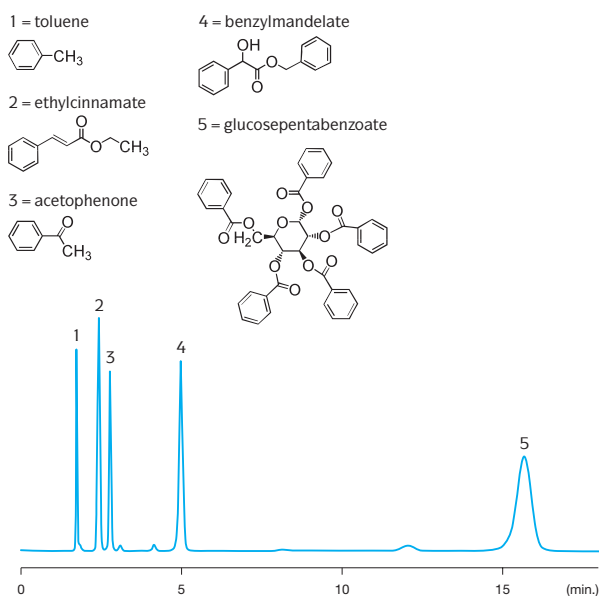


Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4.6 × 250 mm  
 Eluent: KH<sub>2</sub>PO<sub>4</sub>-buffer (10 mM, pH 2.5):ACN (95:5; v:v)  
 Flow rate: 38 µl/min.  
 Detection: UV 254 nm

## Other

## QC test, neutral compounds

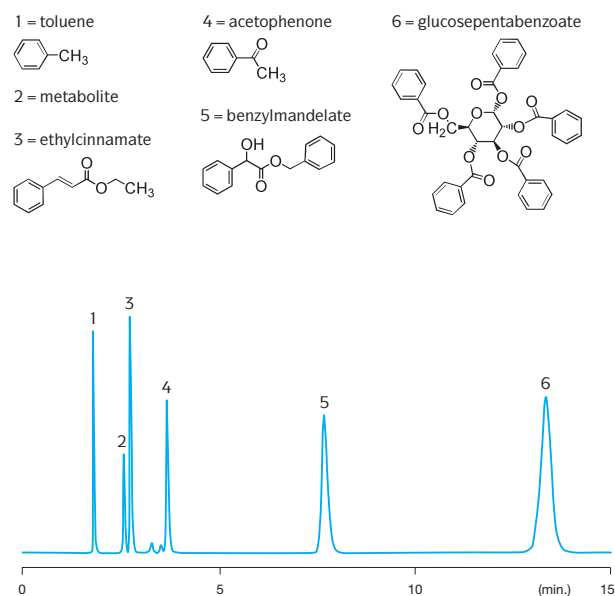
QC test of Kromasil CN. (ref. 341)



Phase: Kromasil 60 Å, 10 µm, CN  
 Column: 4.6 × 250 mm  
 Eluent: hexane:ethylacetate (90:10; v:v)  
 Flow rate: 2 ml/min.  
 Detection: UV 254 nm

## QC test, neutral compounds

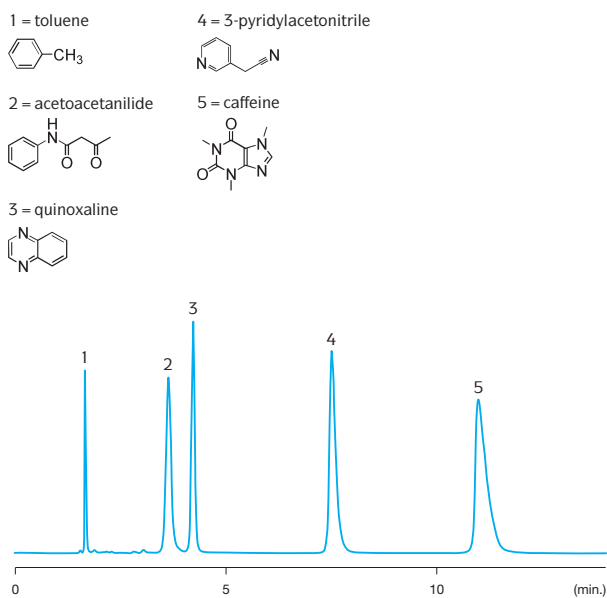
QC test of Kromasil SIL. (ref. 346)



Phase: Kromasil 60 Å, 5 µm, SIL  
 Column: 4.6 × 250 mm  
 Eluent: hexane:ethylacetate (85:15; v:v)  
 Flow rate: 2 ml/min.  
 Detection: UV 254 nm

## QC test, silanophilic compounds

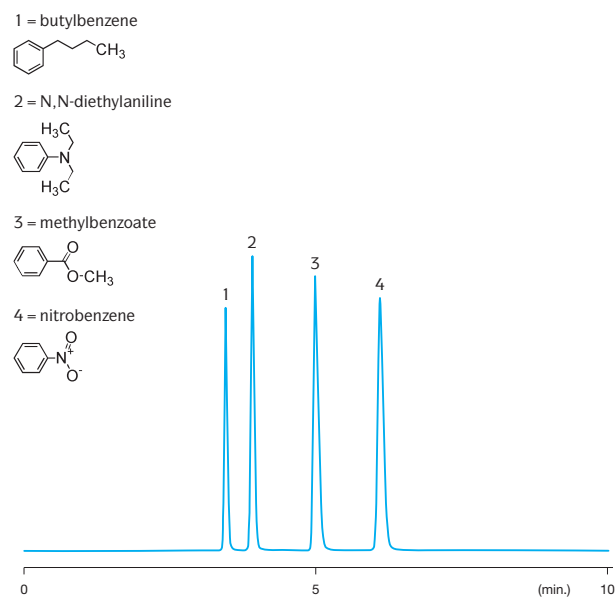
QC test of Kromasil SIL. (ref. 345)



Phase: Kromasil 60 Å, 5 µm, SIL  
 Column: 4.6 × 250 mm  
 Eluent: MeCl<sub>2</sub>:MeOH (98:2; v:v)  
 Flow rate: 2 ml/min.  
 Detection: UV 254 nm

## QC test, substituted aromatic compounds

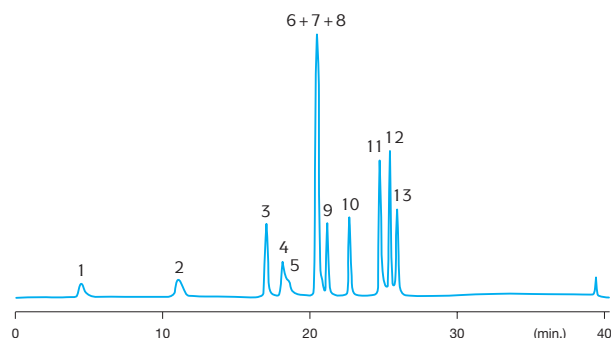
QC test of Kromasil NH2. (ref. 343)



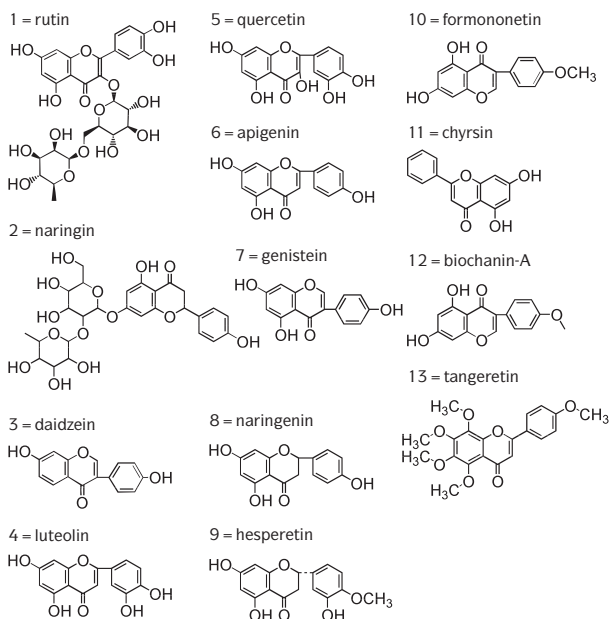
Phase: Kromasil 100 Å, 5 µm, NH2  
 Column: 4.6 × 250 mm  
 Eluent: hexane:MeCl<sub>2</sub> (97:3; v:v)  
 Flow rate: 1 ml/min.  
 Detection: UV 254 nm

## Flavonoid glycosides

Analysis of flavonoid glycosides. (ref. 100)



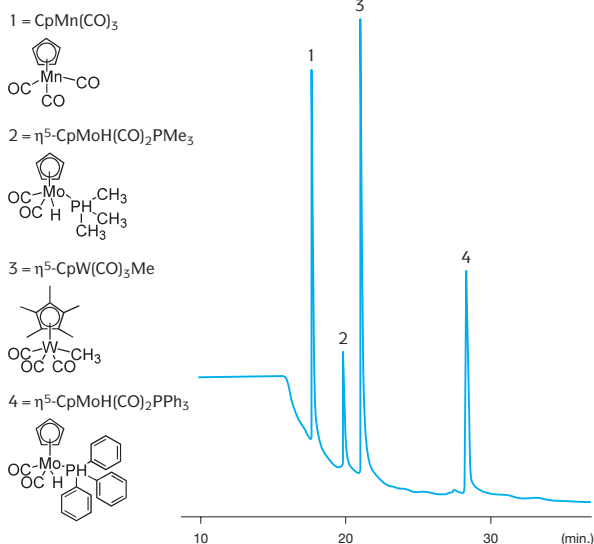
Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 3.2 × 250 mm  
 Eluent: ACN:water  
 Gradient: 0 min. 20% ACN, 10 min. 20% ACN, 18 min. 40% ACN, 28 min. 75% ACN, 30 min. 100% ACN, 37 min. 100% ACN



Flow rate: 0.75 ml/min.  
 Detection: UV 280 nm

## Organometallic catalysts

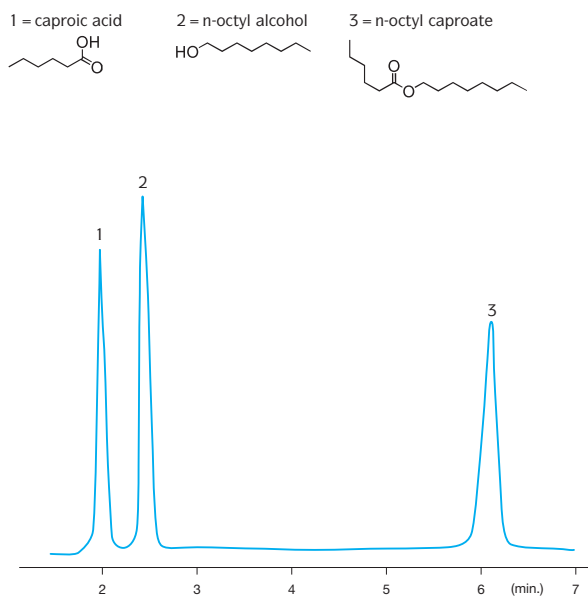
Purity testing of organometallic catalysts. (ref. 248)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.32 × 450 mm  
 Temperature: 60 °C  
 Eluent: carbon dioxide  
 Flow rate: 7.2 µl/min.  
 Pressure: 100 bar (hold 10 min.) then 10 bar/min. until 180 bar (hold 1 min.), then 10 bar/min. until 300 bar (hold 1 min.), then 10 bar/min. until 400 bar (hold 10 min.)  
 Detection: FID

## Surfactants

Determination of caproic acid, n-octyl alcohol and n-octyl caproate. (ref. 285)

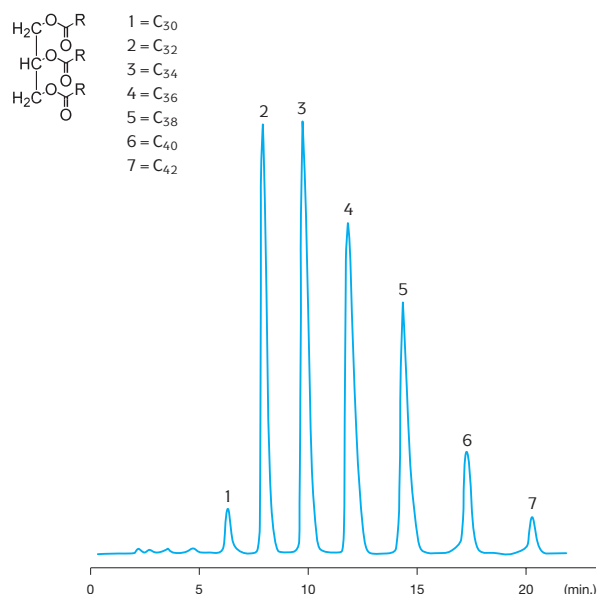


Phase: Kromasil 100 Å, 5 µm, C18  
 Temperature: 30 °C  
 Column: 4.6 × 150 mm  
 Eluent: MeOH:water (95:5; v:v)  
 Flow rate: 1 ml/min.  
 Detection: refractive index

# Other

## Triacylglycerols

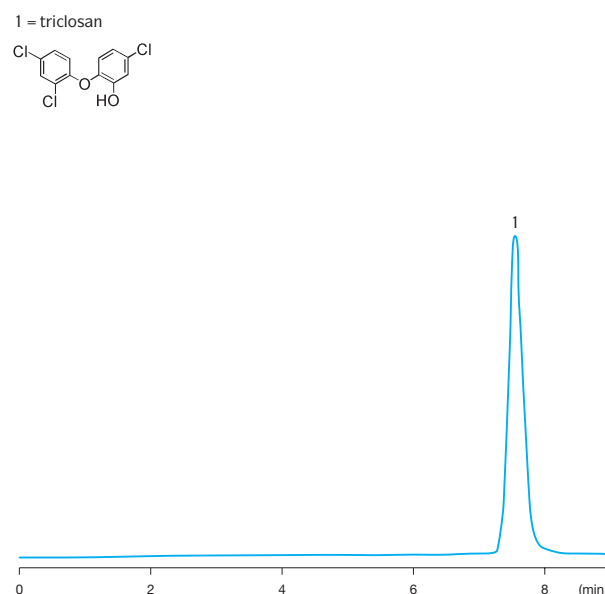
Analysis of seven triacylglycerols. (ref. 139)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 0.7 × 120 mm  
 Eluent: (A):ACN, (B):acetone  
 Gradient: stepwise: 0 – 5 min. 90% A, 5 – 25 min. 70% A, after 25 min. 40%A.  
 Flow rate: 5 – 100 µl/min (not specified)  
 Detection: ELS

## Triclosan

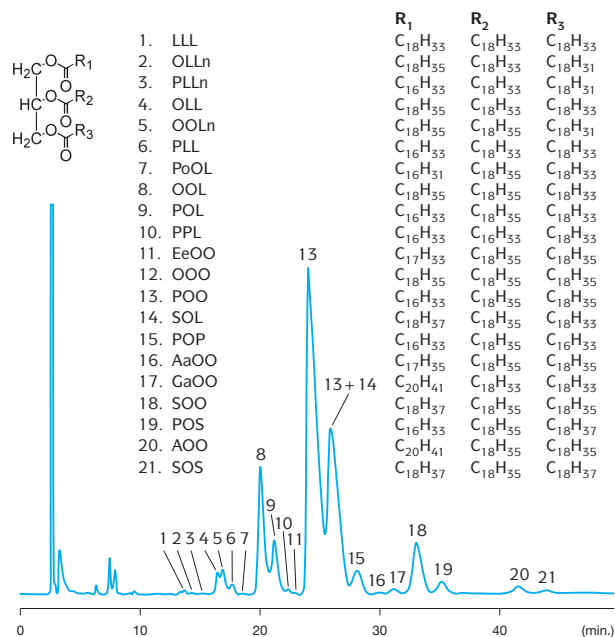
Determination and stability tests of triclosan in disinfectants. (ref. 8)



Phase: Kromasil 100 Å, 7 µm, C18  
 Column: 4.6 × 200 mm  
 Eluent: MeOH:ACN:water (40:40:20; v:v:v) containing 0.02 M KH<sub>2</sub>PO<sub>4</sub> (pH 2.7)  
 Flow rate: 1 ml/min.  
 Detection: UV 280 nm

## Triglycerides

Analysis of triglyceride profiles in Cretan olive oils. (ref. 96)



Phase: Kromasil 100 Å, 5 µm, C18  
 Column: 4 × 250 mm  
 Temperature: 40 °C  
 Eluent: acetone:ACN (60:40; v:v)  
 Flow rate: 0.7 ml/min.  
 Detection: refractive index

# Literature references

- 1 A. Granfors, Masters Project, Dept. Anal. & Marine Chem., Univ. of Gothenburg (2002)
- 6 J. I. D. Wibawa, D.Fowkes D, P.N. Shaw, D. A. Barrett, *J. Chromatogr. B* 774(2) (2002) 141-148 <sup>1</sup>
- 7 J. Yang, L.-G. Sun, X.-Z. Bai, H.-T. Zhou, *Chin. J. Chromatogr.* 20(4) (2002) 369-371 <sup>10</sup>
- 8 J. Li, H.-Y. Zhao, G.-K. Peng, P.-Y. Tian, C.-Q. Li, *Chin. J. Chromatogr.* 20(4) (2002) 372-374 <sup>10</sup>
- 10 K. Nithipatikom, A. J. Grall, B. B. Holmes, D. R. Harder, J. R. Falck, W. B. Campbell, *Anal. Biochem.* 298(2) (2001) 327-336 <sup>1</sup>
- 20 P. Molander, A. Holm, E. Lundanes, D.R. Hegna, E. Ommundsen, T. Greibrokk, *Analyst* 127(7) (2002) 892-897 <sup>9</sup>
- 23 X. Ouyang, S. Ren, *Chin. J. Pharm. Anal.* 22(1) (2002) 78-80 <sup>11</sup>
- 26 A. Zotou, N. Miltiadou, *J. Pharm. Biomed. Anal.* 28(3-4) (2002) 559-568 <sup>1</sup>
- 27 M. Aliani, L. J. Farmer, *J. Agric. Food Chem.* 50(10) (2002) 2760-2766 <sup>13</sup>
- 28 K. Larsson, W. Hermann, P. Möller, D. Sanchez, *J. Chromatogr. A* 450(1) (1988) 71-80 <sup>1</sup>
- 30 B. Gustavsson, I. Betnér, *J. Chromatogr. A* 507 (1990) 67-77 <sup>1</sup>
- 32 R. Boussenadji, P.Dufek, M. Porthault, *LC-GC Int.* 5(10) (1992) 40-43 <sup>7</sup>
- 35 M. Chelminska-Bertilsson, S. Allenmark, *J. Chromatogr. B* 575 (1992) 237-242 <sup>1</sup>
- 38 K.-E. Karlsson, *J. Chromatogr. A* 647(1) (1993) 31-38 <sup>1</sup>
- 40 H. A. Claessens, E. A. Vermeer, C. A. Cramers, *LC-GC Int.* 6(11) (1993) 692-693, 696-698, 700 <sup>7</sup>
- 45 B. Lindegård, H. Björk, J. A. Jönsson, L. Mathiasson, A.-M. Olsson, *Anal. Chem.* 66(24) (1994) 4490-4497 <sup>4</sup>
- 49 S. Joron, H. Robert, *Biomed. Chromatogr.* 8 (1994) 158-164 <sup>2</sup>
- 51 J. Oehlke, M.Brudel, I. E. Blasig, *J. Chromatogr. B* 655(1) (1994) 105-111 <sup>1</sup>
- 53 M. Hedenmo, B.-M. Eriksson, *J. Chromatogr. A* 661(1-2) (1994) 153-159 <sup>1</sup>
- 58 J. Atta-Politou, K. Tsarpalis, A. Koutselinis, *J. Liq. Chromatogr.* 17(18) (1994) 3969-3982 <sup>12</sup>
- 64 B. Jeanny, J.L. Vaillau, P. d'Athis, V. Lahet, *Analisis* 23(1) (1995) 7-11 <sup>3</sup>
- 66 A. Longo, G. Bruno, S.Curti, A. Mancinelli, G. Miotto, *J. Chromatogr. B* 686(2) (1996) 129-139 <sup>1</sup>
- 71 A. J. Oosterkamp, H. Irth, L. Heintz, G. Marko-Varga, U.R. Tjaden, J. van der Greef, *Anal. Chem.* 68 (1996) 4101-4106 <sup>5</sup>
- 73 M. Vallé, P. Malle, S. Bouquelet, *J. AOAC Int.* 79(5) (1996) 1134-1140 <sup>6</sup>
- 82 K. Miki, R. Butler, D. Moore, G. Davidson, *Clin. Chem.* 42(1) (1996) 71-75 <sup>8</sup>
- 87 M. Castegnaro, L. Garren, I. Gaucher, C.P. Wild, *Natural Toxins* 4(6) (1996) 284-290 <sup>14</sup>
- 94 P. Mourier, A. Brun, *J. Chromatogr. B* 704(1-2) (1997) 197-205 <sup>1</sup>
- 95 M. Hay, P. Mormède, *J. Chromatogr. B* 703(1-2) (1997) 15-23 <sup>1</sup>
- 96 E. Stefanoudaki, F. Kotsifaki, A. Koutsaftakis, *Food Chem.* 60(3) (1997) 425-432 <sup>1</sup>
- 97 R. Niemi, H. Taipale, M. Ahlmark, J. Vepsäläinen, T. Järvinen, *J. Chromatogr. B* 701(1) (1997) 97-102 <sup>1</sup>
- 98 J. D. H. Cooper, D.C. Muirhead, J. E. Taylor, P.R. Baker, *J. Chromatogr. B* 701(1) (1997) 87-95 <sup>1</sup>
- 100 H. L. Constant, K. Slowing, J. G. Graham, J. M. Pezzuto, G. A. Cordell, C. W. W. Beecher, *Phytochem. Anal.* 8(4) (1997) 176-180 <sup>15</sup>
- 103 B. Lu, M. Koimur, D. Westerlund, *Chromatographia* 46(1-2) (1997) 72-78 <sup>16</sup>
- 104 V.-P. Ranta, A. Urtti, S. Auriola, *J. Chromatogr. A* 766(1-2) (1997) 85-97 <sup>1</sup>
- 108 J. D. H. Cooper, R. Thadwal, M. J. Cooper, *J. Chromatogr. B* 690(1-2) (1997) 355-358 <sup>1</sup>
- 110 X. Ji, K. Yu, W. Zhang, *Chin. J. Pharm. Anal.* 17(6) (1997) 363-365 <sup>11</sup>
- 112 N. Tharsis, J.L. Portillo, F. Broto-Puig, L. Comellas, *J. Chromatogr. A* 778 (1997) 95-101 <sup>1</sup>
- 113 B. Enanga, C. Labat, H. Boudra, G. Chauvière, M. Keita, B. Bouteille, M. Dumas, G. Houin, *J. Chromatogr. B* 696(2) (1997) 261-266 <sup>1</sup>
- 116 J. M. Joulia, F. Pinguet, P.Y. Grosse, C. Astre, F.Bressolle, *J. Chromatogr. B* 692(2) (1997) 427-435 <sup>1</sup>
- 119 M. D. Rose, J. Bygrave, G.W.F. Stubbings, *Analyst* 123(12) (1998) 2789-2796 <sup>9</sup>
- 124 T. Dine, F.Khalfi, B.Gressier, M. Luycx, C.Brunet, L. Ballester, F.Goudaliez, J. Kablan, M.Cazin, J.C. Cazin, *J. Pharm. Biomed. Anal.* 18(3) (1998) 373-381 <sup>1</sup>
- 126 S. Frappier, D. Breilh, E. Diarte, B. Ba, D. Ducint, J. L. Pellegrin, M.C. Saux, *J. Chromatogr. B* 714(2) (1998) 384-389 <sup>1</sup>
- 129 W.-X. Zhang, C.-G. Jiang, G.-L. Guo, *Chin. J. Pharm. Anal.* 18(5) (1998) 314-316 <sup>11</sup>
- 130 M. A. Campanero, B. Calahorra, E. Garcia-Quetglás, M.Escolar, J. Honorato, *Chromatographia* 48(7-8) (1998) 555-560 <sup>16</sup>
- 132 H. Sabik, R. Jeannot, *J. Chromatogr. A* 818(2) (1998) 197-207 <sup>1</sup>
- 139 M. B. O. Andersson, L. G. Blomberg, *J. Microcolumn Sep.* 10(3) (1998) 249-254 <sup>17</sup>
- 143 A. Le Liboux, O. Pasquier, G. Montay, *J. Chromatogr. B* 708(1-2) (1998) 161-168 <sup>1</sup>
- 154 S. Ravisankar, M. Vasudevan, M. Gandhimathi, B. Suresh, *Talanta* 46(6) (1998) 1577-1581 <sup>1</sup>
- 156 S. Ravisankar, M. Vasudevan, M. J. Nanjan, M. Gandhimathi, B. Suresh, *Indian Drugs* 35(6) (1998) 359-363 <sup>19</sup>
- 159 M. Vallé, P. Malle, S. Bouquelet, *J. AOAC Int.* 81(3) (1998) 571-575 <sup>6</sup>
- 161 H. K. Jajoo, N.V.S. Rao Mamidi, K. Kasiram, A. S. Prakash, V.V.S. Swaroop Kumar, P. Bheema Rao, V. Bhushan, S. Subramaniam, *J. Chromatogr. B* 707(1-2) (1998) 241-246 <sup>1</sup>
- 167 N. Masqué, M. Galià, R. M. Marcé, F. Borrull, *J. High Resolut. Chromatogr.* 22(10) (1999) 547-552 <sup>20</sup>
- 170 Ph. Baudot, A. Vicherat, M.-L. Viriot, M.-C. Carré, *Analisis* 27(6) (1999) 523-532 <sup>3</sup>
- 175 D. A. Cassada, S.J. Monson, D.D. Snow, R.F. Spalding, *J. Chromatogr. A* 844(1-2) (1999) 87-95 <sup>1</sup>
- 183 R. Belloli, B. Barletta, E. Bolzacchini, S. Meinardi, M. Orlandi, B. Rindone, *J. Chromatogr. A* 846(1-2) (1999) 277-281 <sup>1</sup>
- 184 E. Lesellier, *Analisis* 27(3) (1999) 241-249 <sup>5</sup>
- 188 F. J. Señoráns, K. E. Markides, L. Nyholm, *J. Microcolumn Sep.* 11(5) (1999) 385-391 <sup>17</sup>
- 193 I. Zaitseva, M. Ajmal, E. Cersosimo, *J. Chromatogr. B* 727(1-2) (1999) 15-22 <sup>1</sup>
- 198 R. Trones, A. Tangen, W. Lund, T. Greibrokk, *J. Chromatogr. A* 835(1-2) (1999) 105-112 <sup>1</sup>

- 201 R. Castro, E. Moyano, M. T. Galceran, J. Chromatogr. A 830(1) (1999) 145-154<sup>1</sup>
- 208 P. Molander, K. Haugland, D. R. Hegna, E. Ommundsen, E. Lundanes, T. Greibrokk, J. Chromatogr. A 864(1) (1999) 103-109<sup>1</sup>
- 209 V. Ferreira, P. Hernandez-Orte, A. Escudero, R. Lopez, J. Cacho, J. Chromatogr. A 864(1) (1999) 77-88<sup>1</sup>
- 210 X.-F. Wei, Y.-Q. Du, Acad. J. of Guangdong Coll. of Pharm. 15(3) (1999) 164-166<sup>21</sup>
- 213 Y.-C. Liang, Z.-Z. Yi, Z.-H. Cai, G.-Y. Zhu, Chin. J. Chromatogr. 17(4) (1999) 397-398<sup>10</sup>
- 214 Y.-C. Liang, Z.-Z. Yi, Z.-H. Cai, G.-Y. Zhu, Anal. Lab. 18(3) (1999) 55-57<sup>22</sup>
- 215 B. Liao, C. Xin, J. Chin. Pharm. Univ. 30(2) (1999) 121-123<sup>25</sup>
- 217 B. Ba. Boubakar, A.-G. Corniot, D. Ducint, D. Breilh, J. Grellet, M.-C. Saux, J. Chromatogr. B 724 (1999) 127-136<sup>1</sup>
- 228 B. Tavazzi, R. Vagnozzi, D. Di Perro, A. M. Amorini, G. Fazzina, S. Signoretti, A. Marmarou, I. Caruso, G. Lazzarino, Anal. Biochem. 277(1) (2000) 104-108<sup>1</sup>
- 237 D. Di Pierro, G. Lazzarino, F. S. Pastore, B. Tavazzi, F. Del Bolgia, A. M. Amorini, G. Fazzina, R. Giuffrè, Anal. Biochem. 284 (2000) 301-306<sup>1</sup>
- 244 N. V. S. Rao Mamidi, V. V. S. Swaroop Kumar, K. Katneni, M. Rao Chaluvadi, S. Shreeram, S. Gangadhar, B. Nataraj, P. Hari Kishore, V. Bhushan, S. Subramaniam, J. Pharm. Biomed. Anal. 22(2) (2000) 251-255<sup>1</sup>
- 246 J. J. Berzas Nevado, G. Castañeda Peñalvo, F. J. Guzmán Bernardo, J. Chromatogr. A 870(1-2) (2000) 169-177<sup>1</sup>
- 247 E. G. de Jalón, M. Josa, M. A. Campanero, S. Santoyo, P. Ygartua, J. Chromatogr. A 870(1-2) (2000) 143-149<sup>1</sup>
- 248 I. Bruheim, I. L. Skuland, E. Lundanes, T. Greibrokk, J. Chromatogr. A 868(2) (2000) 261-268<sup>1</sup>
- 254 M. Lee, D. I. Min, Ther. Drug Monit. 23(1) (2001) 21-26<sup>24</sup>
- 258 X. Ran, D. Hu, J. Wang, Chin. J. Pharm. Anal. 21(5) (2001) 369-370<sup>11</sup>
- 262 L.-S. Li, W.-D. Huang, Q. He, S. Ye, Chin. J. Chromatogr. 19(5) (2001) 446-448<sup>10</sup>
- 267 J. J. Berzas Nevado, G. Castañeda Peñalvo, F. J. Guzmán Bernardo, Analytica Chimica Acta 442 (2001) 241-248<sup>1</sup>
- 268 H.-Q. Zhu, J.-L. Ming, Chin. J. Pharm. Anal. 21(3) (2001) 198-200<sup>11</sup>
- 271 K. A. Georga, V. F. Samanidou, I. N. Papadoyannis, J. Chromatogr. B 759(2) (2001) 209-218<sup>1</sup>
- 272 M. C. Quintana, M. H. Blanco, J. Lacal, L. Hernandez, J. Liq. Chromatogr. Relat. Technol. 24(5) (2001) 735-745<sup>25</sup>
- 273 X.-S. Zhang, Y.-C. Liu, L. Wang, C.-S. Lin, J. China Univ. Sci. Tech. 31(2) (2001) 213-217
- 274 F. Fang, G.-J. Xu, B. Lu, J. Liq. Chromatogr. Relat. Technol. 24(7) (2001) 1021-1027<sup>25</sup>
- 277 Y.-M. Guan, H.-L. You, J. Wang, X. Lin, Chin. J. Pharm. Anal. 21(2) (2001) 107-109<sup>11</sup>
- 279 S. Zhang, J. Yi, Z. Tan, H. Zhou, Zhongguo Yiyuan Yaoxue Zazhi 21(3) (2001) 139-141<sup>26</sup>
- 283 Y. Li, G.-F. Wang, Y.-F. Wu, L.-H. Long, Chin. J. Pharm. Anal. 21(1) (2001) 33-36<sup>11</sup>
- 285 G.-W. Zhou, X.-R. Huang, Y.-Z. Li, G.-Z. Li, W. Hu, S.-F. Song, Fine chemicals 18(1) (2001) 29-30,33<sup>27</sup>
- 286 T. Shao, Y.-D. Long, T.-B. Huang, Chin. J. Anal. Chem. 29(1) (2001) 74-76<sup>28</sup>
- 297 C.-L. Liu, M.-C. Liu, P.-L. Zhu, Chromatographia 55(5-6) (2001) 317-320<sup>16</sup>
- 301 Y.-H. Tang, D.-Q. Zhu, Y.-F. Guan, Chin. J. Chromatogr. 19(4) (2001) 289-292<sup>10</sup>
- 306 I. N. Papadoyannis, V. F. Samanidou, P. G. Stefanidou, J. Liq. Chromatogr. Relat. Technol. 25(13-15) (2001) 2315-2335<sup>25</sup>
- 307 Y.-J. Zhao, Z.-T. Han, W.-Z. Wang, X.-J. Ma, J.-H. Zheng, Chin. J. Anal. Chem. 30(9) (2001) 1109-1111<sup>28</sup>
- 309 P. Molander, A. Thomassen, L. Kristoffersen, T. Greibrokk, E. Lundanes, J. Chromatogr. B 766 (2001) 77-87<sup>1</sup>
- 315 EKA, Kromasil Application Note
- 316 EKA, Kromasil Application Note
- 330 EKA, Kromasil Application Note
- 331 EKA, Kromasil Application Note
- 341 EKA, Kromasil Application Note
- 342 EKA, Kromasil Application Note
- 343 EKA, Kromasil Application Note
- 344 EKA, Kromasil Application Note
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proline, PTC-	6	theophylline	28	vitamin E	33
prometryn	24	thiabendazole	23	xanthine	7
propanamine (MDEA), N-ethyl- 1-(1,3-benzodioxol-5-yl)-2-	15	thiamine chloride	33	xylazine	22
propanamine (MDMA), N-methyl- 1-(1,3-benzodioxol-5-yl)-2-	15	thiazolidine-2,4-dione, 5[4-[N-(20pyridyl)-(2s)-pyrrolidine- 2-methoxy]phenylmethylene], maleic acid salt	18	xylose	27
propane, 1,3-diamino-	34	thiazolidinedione	18		
propazine	24	threonine, Fmoc-	6		
propionyl-L-carnitine 1-amino- anthraceneamide	8	threonine, OPA-	8		
propionylpromazine	22	threonine, PTC-	6		
propyl-p-hydroxybenzoate	35	tinidazol	17		
protriptyline	12	TNB	23		
pseudoephedrine	30	TNT	23		
purine	36	TNX	23		
putrescine	34	tocopherol, δ-	33		
pyrene	25	tocopherol, α-	33		
pyridoxine	33	tocopherol, γ-	33		
pyridylacetonitrile, 3-	38	toluene	19		
pyrimethamine	10	toluene	35		
quercetin	39	toluene	36		
quinoxaline	38	toluene	38		
quinupristin (RP 57669)	11	tramadol	22		
RDX	23	triacetylglycerols	40		
resorcinol	24	triamcinolone acetonide acetate	13		
retinol	33	tricarboxyl cyclopentadienyl manganese	39		
rhamnose	27	trichlorobenzene, 1,2,3-	36		
rhamnose, L-	26	trichlorobenzene, 1,2,4-	36		
riboflavine	33	trichlorobenzene, 1,3,5-	36		
ribose	27	triclosan	40		
ritonavir	13	triglycerides from olive oil	40		
rutin	39	trimethoprim	10		
salicin	20	trimethylphosphine hydride dicarbonyl cyclopentadienyl molybdenum	39		
saquinavir	13	trimipramine	11		
SCH 39370 (neutral metallo- endopeptidase inhibitor)	31	triphenylphosphine hydride dicarbonyl cyclopentadienyl molybdenum	39		
scopolamine	29	troglitazone	15		
serine, Fmoc-	6	tryptamine	34		
serine, OPA-	8	tryptophan, PTC-	6		
serine, PTC-	6	tryptophane, Fmoc-	6		
		Tyr	31		

# Availability of Kromasil

## Kromasil 60 Å bulk packings

Phases	Particle sizes, $\mu\text{m}$					
	3.5	5	7	10	13	16
SIL	□	■	■	■	■	■
CN	□	■	□	■	□	■

## Kromasil 100 Å bulk packings

Phases	Particle sizes, $\mu\text{m}$					
	3.5	5	7	10	13	16
SIL	■	■	■	■	■	■
C4	■	■	■	■	■	■
C8	■	■	■	■	■	■
C18	■	■	■	■	■	■
NH2	■	■	■	■	■	■
Chiral DMB	□	■	□	■	□	■
Chiral TBB	□	■	□	■	□	■

## Kromasil 300 Å bulk packings

Phases	Particle sizes, $\mu\text{m}$					
	3.5	5	7	10	13	16
SIL	□	■	□	■	□	■
C4	□	■	□	■	□	■
C8	□	■	□	■	□	■
C18	□	■	□	■	□	■

■ = available as standard product    □ = please inquire!

## Kromasil HPLC columns

Kromasil high pressure slurry-packed columns are available in dimensions from 2.1 mm up to 50.8 mm (2") inner diameter, all columns packed with analytical performance. For detailed information on availability please consult our column brochure, or contact us directly.

The moment you adopt our Kromasil High Performance Concept, you join thousands of chromatographers who share a common goal: to achieve better separations when analyzing or isolating pharmaceuticals or other substances.

Not only will you benefit from our patented silica technology, but you gain a strong partner with a reliable track record in the field of silica products. For the past 60 years, Eka Chemicals has pioneered new types of silica. Our long experience in the field of silica chemistry is the secret behind the development of Kromasil, and the success of our Separation Products Group.

Kromasil is available in bulk, or in high-pressure slurry-packed columns. The development, production and marketing of Kromasil are ISO 9001 certified.

Eka Chemicals is a global company with 3,000 people in 30 countries. It is a business unit within Akzo Nobel, one of the world's largest chemical groups, with more than 67,000 employees in 80 countries.

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