Kromasil application guide

Kromasil®

The way to peak performance
in liquid chromatography

AkzoNobel

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.

Content

Guidelines	3
Applications	6
Amino acids	6
Drugs and metabolites	9
Environmental	23
Food and nutrition	26
Natural products	28
Peptides	31
Vitamins	33
Other	34
Literature references	41
Substance index	44
Kromasil availability	47

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 (µm)	Flow rate (ml/min.)	Relative time	Relative R_s	Relative ΔP
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, ΔP, 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 lifetime 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 µm particle give twice the efficiency compared to 10 µm, 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 µm 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:

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

1. **The separation factor, α, 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 µm particles are recommended, since the efficiency, back pressure, etc. then will be close to the large scale separation. For large scale 10 – 16 µm 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$_{0.1}$ was 1.19

Conditions: Packing material: 83 kg Kromasil 10 µm 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 0.1M 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 (I. 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 metylchloroformate) 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 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

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
R-OH

12 = Fmoc-NH_2
R-NH_2

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

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_2PO_4, 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: tetrabutylammonuim hydroxide 2.8 mM: KH_2PO_4 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-amino-anthraceneamide

2 = acetyl-L-carnitine 1-aminoanthracene-amide

3 = methansulfonyl-L-carnitine 1-amino-anthraceneamide

R = 1-amino-anthracene group

4 = propionyl-L-carnitine 1-aminoanthracene-amide

5 = isobutyryl-L-carnitine 1-aminoanthracene-amide

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 (λ_{ex} 248 mn, λ_{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-aminobuturic acid (GABA)

12 = OPA-alanine

13 = OPA-tyrosine

14 = OPA-p-borono-phenylalanine

15 = OPA-valine

16 = OPA-phenylalanine

17 = OPA-isoleucine

18 = OPA-leucine

19 = OPA-ornitine

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_3COONa (pH 7.4) : 50 mM $NaHPO_4$ (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 (λ_{ex} 330 nm, λ_{em} 430 nm)

Drugs and metabolites

Amoxicillin

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

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 (λ_{ex} 365 nm, λ_{em} 445 nm)

Amperozide

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

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

Drugs and metabolites

Antibacterial drugs

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

1 = chlorhexidine

2 = metronidazole

3 = clotrimazole

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, $(C_4H_9)NBr$ 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)

1 = sulfamethazine

2 = pyrimethamine

3 = sulfaquinoxaline

Phase:	Kromasil 100 Å, 5 µm, C18
Column:	4.6 × 150 mm
Eluent:	40 mM phosphate buffer (pH 3 containing 10 mM ClO_4^-) : 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)

1 = trimethoprim

4 = sulfadimethoxine

5 = bromhexine

2 = sulfamethoxypyridazine

3 = sulfamethoxazole

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-trizin-3-yl)- thio]methyl]-cephalosporanic acid (7-ACT). (ref. 129)

1 = 7-ACA

2 = 7-ACT

3 = ceftriaxone

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 (λ_{ex} 360 nm and λ_{em} 410 nm)

Anticonvulsants

Determination of theophylline, phenobarbitone, diphentoin 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)

1 = E-10-OH-nortriptyline

2 = Z-10-OH-nortriptyline

3 = 8-OH-desmethyl-clomipramine

4 = 8-OH-clomipramine

5 = doxepine

6 = protriptyline

7 = nortriptyline

8 = amitriptyline

9 = desmethyl-clomipramine

10 = clomipramine

Phase: Kromasil 100 Å, 5 µm, C8
Column: 4 × 250 mm
Temperature: ambient
Eluent: ACN:KH_2PO_4 (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)

1 = (-)-trans-4-(4-fluorophenyl)-3-(4-hydroxy-3-methoxy-phenoxymethyl)piperidine

2 = (-)-trans-4-(4-fluorophenyl)-3-(3-hydroxy-4-methoxy-phenoxymethyl)piperidine

3 = didesmethylcitalopram

4 = desmethyl-citalopram

5 = citalopram

6 = citalopram N-oxide

7 = paroxetine

8 = protriptyline

9 = norfluoxetine

10 = fluoxetine

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_4HCOO (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)

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)

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)

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)

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)

1 = clozapine

2 = loxapine

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)

1 = norepinephrine

2 = epinephrine

3 = 3-4-dihydroxy-benzylamine hydrobromide

4 = dopamine

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)

1 = normetanephrine

2 = metanephrine

3 = 4-hydroxy-3-methoxy-benzylamine hydrochloride

4 = 3-O-methyldopamine

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)

1 = ciprofloxacin

2 = anthranilic acid

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 (λ_{ex} 300 nm, λ_{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)

1 = 14,15-DHET

2 = 11,12-DHET

3 = 8,9-DHET

4 = 5,6-DHET

5 = 20-HETE

6 = 14,15-EET

7 = 11,12-EET

8 = 8,9-EET

9 = 5,6-EET

DHET = dihydroxy-eicosatrienoic acids
HETE = hydroxy-eicosatetraenoic acids
EET = epoxy-eicosatrienoic acids

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_2PO_4:ACN:MeOH (22.5:37.5:40; v:v:v) (pH 5.0)
Flow rate:	1 ml/min.
Detection:	fluorescence (λ_{ex} 292 nm and λ_{em} 325 nm)

Ecstacy 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

5-fluorouracil metabolites

Determination of the main metabolites of 5-fluorouracil in plasma. (ref. 116)

Phase: Kromasil 100 Å, 5 µm, C18
Column: 4.6 × 150 mm
Temperature: 20 °C (ambient)
Eluent: MeOH:water (3:97; v:v)
Flow rate: 0.6 ml/min.
Detection: UV 275 nm

Fotemustine

Stability study of fotemustine in PVC infusion bags. (ref. 124)

Phase: Kromasil 100 Å, 5 µm, C18
Column: 4.6 × 150 mm
Temperature: ambient
Eluent: ACN:ammonium acetate buffer (0.05 M, pH 4.5) (30:70; v:v)
Flow rate: 1 ml/min.
Detection: UV 230 nm

Ketoprofen

Determination of ketoprofen in vitro in rat skin. (ref. 247)

Phase: Kromasil 100 Å, 5 µm, C18
Column: 4 × 250 mm
Temperature: 40 °C
Eluent: ACN:0.01 M potassium phosphate (pH 1.5) (60:40; v:v)
Flow rate: 1 ml/min.
Detection: UV 260 nm

Leukotrienes, cross-reactive

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

Phase: Kromasil 100 Å, 5 µm, C4
Column: 2.1 × 100 mm
Eluent: ACN:K_2HPO_4 10 mM (pH 7.4) (30:70; v:v)
Flow rate: 0.2 ml/min.
Detection: fluorescence (λ_{ex} 544 nm, λ_{em} 572 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_2HPO_4 10 mM (pH 7.4) (30:70; v:v)
Flow rate: 0.2 ml/min.
Detection: fluorescence (λ_{ex} 544 nm, λ_{em} 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)

1 = PAT-5A

2 = thiazolidinedione

Phase:	Kromasil 100 Å, 5 µm, C18
Column:	4.6 × 250 mm
Eluent:	NaH_2PO_4 (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)

1 = 4-nitrophenyl-β-
-D-glucuronide

2 = 4-nitrophenol

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_2HPO_4-buffer, pH 7.6 (adjusted with orthophosphoric acid), containing 0.25 mM $THAHSO_4$ (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_2PO_4 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_2PO_4 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_2PO_4 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_2PO_4 25 mM pH 6.0 (80:20; v:v)
Flow rate: 1 ml/min.
Detection: UV 215 nm

Drugs and metabolites

Quinolinones

Determination of quinolinones in food. (ref. 119)

Phase: Kromasil 100 Å, 5 µm, C8
Column: 3.2 × 250 mm
Eluent: oxalic acid (0.01 M):ACN:MeOH (6:3:1; v:v:v)
Flow rate: 0.5 ml/min.
Detection: fluorescence (λ_{em} 445 nm, λ_{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_2PO_4 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)

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

5 = spiramycin S

α-mycarose

timonacic

	R1	R2	R3
1. cysteyl neospiramycin I	H	H	timonacic
2. cysteyl spiramycin I	H	α-mycarose	timonacic
3. spiramycin I +	H	α- mycarose	COH
cysteyl neospiramycin III	$COCH_2CH_3$	H	timonacic
4. cysteyl spiramycin III	$COCH_2CH_3$	α-mycarose	timonacic
5. spiramycin S			
6. spiramycin III	$COCH_2CH_3$	α-mycarose	COH

Phase: Kromasil 100 Å, 5 µm, C8
Column: 4.6 × 250 mm
Temperature: 60 °C
Eluent: CH_3CN:sodium phosphate buffer (0.05 M pH 2.3) (33:67; v:v) + 6 g/l $NaClO_4$
Flow rate: 1.1 ml/min.
Detection: UV 232 nm

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 (λ_{ex} 380 nm and λ_{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_2PO_4 and 0.05 M triethylamine, adjusted to pH 7.90
Flow rate:	1 ml/min.
Detection:	fluorescence (λ_{ex} 207 nm and λ_{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

Determinaiton 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_2PO_4 (pH 4.5 with H_3PO_4):ACN (90:10; v:v) B: 0.005 M KH_2PO_4 (pH 4.5 with H_3PO_4):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 litium 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

Environmental

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_2:ACN
Gradient: 0 min. 100% CO_2, 20 min. 60% CO_2, 25 min. 60% CO_2
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_2
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, NH2
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, NH2
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_3PO_4)
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_1	R_2	R_3
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_3OH (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_2HPO_4 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_{ex} 340 nm, λ_{em} 455 nm)

Natural products

TCM, Traditional Chinese Medicine

Determination of gastrodin, p-hydroxybenzyl alcohol, vanillyl alcohol, p-hydroxylbenzaldehyde 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_8
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

Enkephalin peptides

Analysis of enkephalin peptides, their metabolites and enzyme inhibitors. (ref. 104)

Phase:	Kromasil 100 Å, 5 µm, C8
Column:	4.6 × 150 mm
Eluent A:	35 mM phosphate buffer (pH 2.1)
Eluent B:	59 mM phosphate buffer (pH 2.1) – ACN (60:40; v:v)
Gradient:	ACN from 4 to 5% in 9 min., then to 15% in 5 min., finally to 30% in 21 min.
Flow rate:	1 ml/min.
Detection:	UV 205 nm

Nonapeptides

Analysis of five nonapeptides. (ref. 28)

1 = 8-Arg-vasotocin

Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Arg-Gly-NH_2

2 = 8-Arg-vasopressin

Cys-Tyr-Phe-Gln-Asn-Cys-Pro-Arg-Gly-NH_2

3 = d-4-Asn-8-D-vasopressin

Mpr-Tyr-Phe-Asn-Asn-Cys-Pro-D-Arg-Gly-NH_2

4 = d-8-D-Arg-vasopressin

Mpr-Tyr-Phe-Gln-Asn-Cys-Pro-D-Arg-Gly-NH_2

5 = oxytocin

Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH_2

Phase:	Kromasil 100 Å, 12.5 µm, C18
Column:	10 × 250 mm
Eluent:	ACN:phosphate buffer (pH 7) (18:82; v:v)
Flow rate:	4 ml/min.
Detection:	UV 225 nm

Peptides

Peptides

Separation of 9 peptides. (ref. 316)

1 = oxytocin

Cys-Tyr-Ile-Gln-Asn-Cys-Pro-Leu-Gly-NH_2

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-NH_2

Phase:	Kromasil 100 Å, 5 µm, C8
Column:	4.5 × 250 mm
Temperature:	ambient
Eluent A:	0.1% TFA in 10% CH_3CN and 90% water
Eluent B:	0.1% TFA in 90% CH_3CN 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_2 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_3)

3 = pyridoxine (vitamin B_6)

4 = riboflavine (vitamin B_2)

5 = thiamine chloride (vitamin B_1)

Phase: Kromasil 100 Å, 10 µm, NH2
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)

1 = NH_3^+ R

2 = methylamine

3 = tryptamine

4 = 1,3-diaminopropane

5 = putrescine

6 = cadaverine

7 = histamine

8 = tyramine

9 = spermidine

10 = spermine

dansyl derivative group

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

Amino alcohols

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

1-ethylamino-3-phenoxy-propan-2-ol

1 = 3-{3-[Ethyl-(2-hydroxy-3-phenoxy-propyl)-amino]-propane-1-sulfinyl}-propan-1-ol

R =

2 = 1-{Ethyl-[3-(2-hydroxy-propane-1-sulfonyl)-propyl]-amino}-3-phenoxy-propan-2-ol

R =

3 = 3-{3-[Ethyl-(2-hydroxy-3-phenoxy-propyl)-amino]-propane-1-sulfonyl}-propan-1-ol

R =

4 = 1-[Ethyl-(3-methanesulfonyl-propyl)-amino]-3-phenoxy-propan-2-ol

R =

5 = 1-{Ethyl-[2-hydroxy-3-(propane-1-sulfonyl)-propyl]-amino}-3-phenoxy-propan-2-ol

R =

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

Other

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 sulfonurea, 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 derivates. (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_2HPO_4 + 40 mM KH_2PO_4)
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 derivates. (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

Other

Fatty acids

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

1 = linolenic acid (phenacyl ester derivative)

2 = myristic acid (phenacyl ester derivative)

3 = palmitoleic acid (phenacyl ester derivative)

4 = arachidonic acid (phenacyl ester derivative)

5 = linoleic acid (phenacyl ester derivative)

6 = palmitic acid (phenacyl ester derivative, internal standard)

7 = palmitic acid (phenacyl ester derivative)

8 = oleic acid (phenacyl ester derivative)

9 = elaidic acid (phenacyl ester derivative)

10 = stearic acid (phenacyl ester derivative)

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)

1 = fluorescent ester of lauric acid

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 (λ_{ex} 357.5 nm and λ_{em} 482 nm)

Organic acids

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

1 = formic acid

2 = benzoic acid

3 = lactic acid

4 = acetic acid

Phase:	Kromasil 100 Å, 5 µm, C18
Column:	4.6 × 250 mm
Eluent:	KH_2PO_4-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)

1 = toluene

2 = ethylcinnamate

3 = acetophenone

4 = benzylmandelate

5 = glucosepentabenzoate

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)

1 = toluene

2 = metabolite

3 = ethylcinnamate

4 = acetophenone

5 = benzylmandelate

6 = glucosepentabenzoate

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)

1 = toluene

2 = acetoacetanilide

3 = quinoxaline

4 = 3-pyridylacetonitrile

5 = caffeine

Phase:	Kromasil 60 Å, 5 µm, SIL
Column:	4.6 × 250 mm
Eluent:	$MeCl_2$: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)

1 = butylbenzene

2 = N,N-diethylaniline

3 = methylbenzoate

4 = nitrobenzene

Phase:	Kromasil 100 Å, 5 µm, NH2
Column:	4.6 × 250 mm
Eluent:	hexane:$MeCl_2$ (97:3; v:v)
Flow rate:	1 ml/min.
Detection:	UV 254 nm

Other

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_2PO_4 (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 [1]

7 J. Yang, L.-G. Sun, X.-Z. Bai, H.-T. Zhou, Chin. J. Chromatogr. 20(4) (2002) 369-371 [10]

8 J. Li, H.-Y. Zhao, G.-K. Peng, P.-Y. Tian, C.-Q. Li, Chin. J. Chromatogr. 20(4) (2002) 372-374 [10]

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 [1]

20 P. Molander, A. Holm, E. Lundanes, D.R. Hegna, E. Ommundsen, T. Greibrokk, Analyst 127(7) (2002) 892-897 [9]

23 X. Ouyang, S. Ren, Chin. J. Pharm. Anal. 22(1) (2002) 78-80 [11]

26 A. Zotou, N. Miltiadou, J. Pharm. Biomed. Anal. 28(3-4) (2002) 559-568 [1]

27 M. Aliani, L. J. Farmer, J. Agric. Food Chem. 50(10) (2002) 2760-2766 [13]

28 K. Larsson, W. Hermann, P. Möller, D. Sanchez, J. Chromatogr. A 450(1) (1988) 71-80 [1]

30 B. Gustavsson, I. Betnér, J. Chromatogr. A 507 (1990) 67-77 [1]

32 R. Boussenadji, P.Dufek, M. Porthault, LC-GC Int. 5(10) (1992) 40-43 [7]

35 M. Chelminska-Bertilsson, S. Allenmark, J. Chromatogr. B 575 (1992) 237-242 [1]

38 K.-E. Karlsson, J. Chromatogr. A 647(1) (1993) 31-38 [1]

40 H. A. Claessens, E. A. Vermeer, C. A. Cramers, LC-GC Int. 6(11) (1993) 692-693, 696-698, 700 [7]

45 B. Lindegård, H. Björk, J. A. Jönsson, L. Mathiasson, A.-M. Olsson, Anal. Chem. 66(24) (1994) 4490-4497 [4]

49 S. Joron, H. Robert, Biomed. Chromatogr. 8 (1994) 158-164 [2]

51 J. Oehlke, M.Brudel, I. E. Blasig, J. Chromatogr. B 655(1) (1994) 105-111 [1]

53 M. Hedenmo, B.-M. Eriksson, J. Chromatogr. A 661(1-2) (1994) 153-159 [1]

58 J. Atta-Politou, K. Tsarpalis, A. Koutselinis, J. Liq. Chromatogr. 17(18) (1994) 3969-3982 [12]

64 B. Jeanny, J.L. Vailleau, P. d´Athis, V. Lahet, Analusis 23(1) (1995) 7-11 [3]

66 A. Longo, G. Bruno, S.Curti, A. Mancinelli, G. Miotto, J. Chromatogr. B 686(2) (1996) 129-139 [1]

71 A. J. Oosterkamp, H. Irth, L. Heintz, G. Marko-Varga, U.R. Tjaden, J. van der Greef, Anal. Chem. 68 (1996) 4101-4106 [5]

73 M. Vallé, P. Malle, S. Bouquelet, J. AOAC Int. 79(5) (1996) 1134-1140 [6]

82 K. Miki, R. Butler, D. Moore, G. Davidson, Clin. Chem. 42(1) (1996) 71-75 [8]

87 M. Castegnaro, L. Garren, I. Gaucher, C.P. Wild, Natural Toxins 4(6) (1996) 284-290 [14]

94 P. Mourier, A. Brun, J. Chromatogr. B 704(1-2) (1997) 197-205 [1]

95 M. Hay, P. Mormède, J. Chromatogr. B 703(1-2) (1997) 15-23 [1]

96 E. Stefanoudaki, F. Kotsifaki, A. Koutsaftakis, Food Chem. 60(3) (1997) 425-432 [1]

97 R. Niemi, H. Taipale, M. Ahlmark, J. Vepsäläinen, T. Järvinen, J. Chromatogr. B 701(1) (1997) 97-102 [1]

98 J. D. H. Cooper, D.C. Muirhead, J. E. Taylor, P.R. Baker, J. Chromatogr. B 701(1) (1997) 87-95 [1]

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 [15]

103 B. Lu, M. Koimur, D. Westerlund, Chromatographia 46(1-2) (1997) 72-78 [16]

104 V.-P. Ranta, A. Urtti, S. Auriola, J. Chromatogr. A 766(1-2) (1997) 85-97 [1]

108 J. D. H. Cooper, R. Thadwal, M. J. Cooper, J. Chromatogr. B 690(1-2) (1997) 355-358 [1]

110 X. Ji, K. Yu, W. Zhang, Chin. J. Pharm. Anal. 17(6) (1997) 363-365 [11]

112 N. Tharsis, J.L. Portillo, F. Broto-Puig, L. Comellas, J. Chromatogr. A 778 (1997) 95-101 [1]

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 [1]

116 J. M. Joulia, F. Pinguet, P.Y. Grosse, C. Astre, F.Bressolle, J. Chromatogr. B 692(2) (1997) 427-435 [1]

119 M. D. Rose, J. Bygrave, G.W.F. Stubbings, Analyst 123(12) (1998) 2789-2796 [9]

124 T. Dine, F.Khalfi, B.Gressier, M. Luyckx, C.Brunet, L. Ballester, F.Goudaliez, J. Kablan, M.Cazin, J.C. Cazin, J. Pharm. Biomed. Anal. 18(3) (1998) 373-381 [1]

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 [1]

129 W.-X. Zhang, C.-G. Jiang, G.-L. Guo, Chin. J. Pharm. Anal. 18(5) (1998) 314-316 [11]

130 M. A. Campanero, B. Calahorra, E. Garcia-Quetglás, M.Escolar, J. Honorato, Chromatographia 48(7-8) (1998) 555-560 [16]

132 H. Sabik, R. Jeannot, J. Chromatogr. A 818(2) (1998) 197-207 [1]

139 M. B. O. Andersson, L. G. Blomberg, J. Microcolumn Sep. 10(3) (1998) 249-254 [17]

143 A. Le Liboux, O. Pasquier, G. Montay, J. Chromatogr. B 708(1-2) (1998) 161-168 [1]

154 S. Ravisankar, M. Vasudevan, M. Gandhimathi, B. Suresh, Talanta 46(6) (1998) 1577-1581 [1]

156 S. Ravisankar, M. Vasudevan, M. J. Nanjan, M. Gandhimathi, B. Suresh, Indian Drugs 35(6) (1998) 359-363 [19]

159 M. Vallé, P. Malle, S. Bouquelet, J. AOAC Int. 81(3) (1998) 571-575 [6]

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 [1]

167 N. Masqué, M. Galià, R. M. Marcé, F. Borrull, J. High Resolut. Chromatogr. 22(10) (1999) 547-552 [20]

170 Ph. Baudot, A. Vicherat, M.-L. Viriot, M.-C. Carré, Analusis 27(6) (1999) 523-532 [3]

175 D. A. Cassada, S.J. Monson, D.D. Snow, R.F. Spalding, J. Chromatogr. A 844(1-2) (1999) 87-95 [1]

183 R. Belloli, B. Barletta, E. Bolzacchini, S. Meinardi, M. Orlandi, B. Rindone, J. Chromatogr. A 846(1-2) (1999) 277-281 [1]

184 E. Lesellier, Analusis 27(3) (1999) 241-249 [3]

188 F. J. Señoráns, K. E. Markides, L. Nyholm, J. Microcolumn Sep. 11(5) (1999) 385-391 [17]

193 I. Zaitseva, M. Ajmal, E. Cersosimo, J. Chromatogr. B 727(1-2) (1999) 15-22 [1]

198 R. Trones, A. Tangen, W. Lund, T. Greibrokk, J. Chromatogr. A 835(1-2) (1999) 105-112 [1]

201 R. Castro, E. Moyano, M. T. Galceran, J. Chromatogr. A 830(1) (1999) 145-154 [1]

208 P. Molander, K. Haugland, D. R. Hegna, E. Ommundsen, E. Lundanes, T. Greibrokk, J. Chromatogr. A 864(1) (1999) 103-109 [1]

209 V. Ferreira, P. Hernandez-Orte, A. Escudero, R. Lopez, J. Cacho, J. Chromatogr. A 864(1) (1999) 77-88 [1]

210 X.-F. Wei, Y.-Q. Du, Acad. J. of Guangdong Coll. of Pharm. 15(3) (1999) 164-166 [21]

213 Y.-C Liang, Z.-Z.Yi, Z.-H. Cai, G.-Y. Zhu, Chin. J. Chromatogr. 17(4) (1999) 397-398 [10]

214 Y.-C. Liang, Z.-Z.Yi, Z.-H. Cai, G.-Y. Zhu, Anal. Lab. 18(3) (1999) 55-57 [22]

215 B. Liao, C. Xin, J. Chin. Pharm. Univ. 30(2) (1999) 121-123 [23]

217 B. Ba. Boubakar, A-G. Corniot, D. Ducint, D. Breilh, J. Grellet, M-C. Saux, J. Chromatogr. B 724 (1999) 127-136 [1]

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 [1]

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 [1]

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 [1]

246 J. J. Berzas Nevado, G. Castañeda Peñalvo, F. J. Guzmán Bernardo, J. Chromatogr. A 870(1-2) (2000) 169-177 [1]

247 E. G. de Jalón, M. Josa, M. A. Campanero, S. Santoyo, P. Ygartua, J. Chromatogr. A 870(1-2) (2000) 143-149 [1]

248 I. Bruheim, I. L. Skuland, E. Lundanes, T. Greibrokk, J. Chromatogr. A 868(2) (2000) 261-268 [1]

254 M. Lee, D. I. Min, Ther. Drug Monit. 23(1) (2001) 21-26 [24]

258 X. Ran, D. Hu, J. Wang, Chin. J. Pharm. Anal. 21(5) (2001) 369-370 [11]

262 L.-S. Li, W.-D. Huang, Q. He, S. Ye, Chin. J. Chromatogr. 19(5) (2001) 446-448 [10]

267 J. J. Berzas Nevado, G. Castañeda Peñalvo, F. J. Guzmán Bernardo, Analytica Chimica Acta 442 (2001) 241-248 [1]

268 H.-Q. Zhu, J.-L. Ming, Chin. J. Pharm. Anal. 21(3) (2001) 198-200 [11]

271 K. A. Georga, V. F. Samanidou, I. N. Papadoyannis, J. Chromatogr. B 759(2) (2001) 209-218 [1]

272 M. C. Quintana, M. H. Blanco, J. Lacal, L. Hernandez, J. Liq. Chromatogr. Relat. Technol. 24(5) (2001) 735-745 [25]

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 [25]

277 Y.-M. Guan, H.-L. You, J. Wang, X. Lin, Chin. J. Pharm. Anal. 21(2) (2001) 107-109 [11]

279 S. Zhang, J. Yi, Z.Tan, H. Zhou, Zhongguo Yiyuan Yaoxue Zazhi 21(3) (2001) 139-141 [26]

283 Y. Li, G.-F. Wang, Y.-F. Wu, L.-H. Long, Chin. J. Pharm. Anal. 21(1) (2001) 33-36 [11]

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 [27]

286 T. Shao, Y.-D. Long, T.-B. Huang, Chin. J. Anal. Chem. 29(1) (2001) 74-76 [28]

297 C.-L. Liu, M.-C. Liu, P.-L. Zhu, Chromatographia 55(5-6) (2001) 317-320 [16]

301 Y.-H. Tang, D.-Q. Zhu, Y.-F Guan, Chin. J. Chromatogr. 19(4) (2001) 289-292 [10]

306 I. N. Papadoyannis, V. F. Samanidou, P. G. Stefanidou, J. Liq. Chromatogr. Relat. Technol. 25(13-15) (2001) 2315-2335 [25]

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 [28]

309 P. Molander, A. Thomassen, L. Kristoffersen, T. Greibrokk, E. Lundanes, J. Chromatogr. B 766 (2001) 77-87 [1]

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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

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Substance index

substance	page
1-[Ethyl-(3-methanesulfonyl-propyl)-amino]-3-phenoxy-propan-2-ol	34
1-{Ethyl-[2-hydroxy-3-(propane-1-sulfonyl)-propyl]-amino}-3-phenoxy-propan-2-ol	34
1-{Ethyl-[3-(2-hydroxy-propane-1-sulfonyl)-propyl]-amino}-3-phenoxy-propan-2-ol	34
3-{3-[Ethyl-(2-hydroxy-3-phenoxy-propyl)-amino]-propane-1-sulfinyl}-propan-1-ol	34
3-{3-[Ethyl-(2-hydroxy-3-phenoxy-propyl)-amino]-propane-1-sulfonyl}-propan-1-ol	34
ACA, 7-	10
acenaphthene	25
acenaphthylene	25
acetaminophen	17
acetic acid	37
acetoacetanilide	38
acetophenone	38
acetopromazine	22
acetylaminophenylacetic acid, 4-	28
acetyl-L-carnitine 1-amino-anthraceneamide	8
ACT, 7-	10
actarit	28
adenosine	7
ADP	36
alanine	7
alanine, Fmoc-	6
alanine, PTC-	6
ambroxol	21
ametryn	24
aminobenzoic acid, m-	35
aminobenzoic acid, o-	35
aminobenzoic acid, p-	35
aminobuturic acid, OPA-γ-	8
aminocephalosporanic acid, 7-	10
aminosalicylic acid, 3-	8
aminosalicylic acid, 5-	8
amitriptyline	12
amitriptyline	19
amoxapine	11
amoxicillin degradation derivative	9
AMP	36
amperozide (I)	9
amperozide's N-de-ethyl metabolite (II)	9
amperozide's N-de-ethyl-N-butyl analogue (III)	9
ampicillin degradation derivative	9
angiotensin I	32
angiotensin II	32
anthracene	25
anthracene	35
anthranilic acid	14
antipyrine	30
apigenin	39
arachidonic acid (phenacyl ester derivative)	37
arginine, Fmoc-	6
arginine, OPA-	8
arginine, PTC-	6
ascorbic acid	33
asparagine, OPA-	8
aspartate	7
aspartate, N-acetyl-	7
aspartic acid, Fmoc-	6
aspartic acid, OPA-	8
aspartic acid, PTC-	6
ATP	36
atrazine	24
benz(a)anthracene	25
benzene	35
benzo(a)pyrene	25
benzo(b)fluoranthene	25
benzo(g,h,i)perylene	25
benzo(k)fluoranthene	25
benzoic acid	37
benzothiazoleacetic acid, 4-chloro-2-oxo-3(2H)-	23
benzothiazoleacetic ethyl ester, 4-chloro-2-oxo-3(2H)-	23
benzylmandelate	38
bestatin	31
betamethasone acetate	21
bilobalide	29
biochanin-A	39
biphenyl	35
boronophenylalanine, OPA-p-	8
bradykinin	32
brombenzene	36
bromhexine	10
butanamine (EBDB), N-ethyl-1-(1,3-benzodioxol-5-yl)-2-	15
butanamine (MBDB), N-methyl-1-(1,3-benzodioxol-5-yl)-2-	15
butylbenzene	38
cadaverine	34
caffeine	28
caffeine	30
caffeine	38
caproic acid	39
carbamazepine	11
carbendazim	23
carnitine 1-aminoanthraceneamide,L-	8
ceftriaxone	10
cephalosporanic acid, 7-amino-3-[[(2,5-dihydro-6-hydroxy-2-methyl-5-oxo-1,2,4-trizin-3-yl)- thio]methyl]-	10
chlorhexidine	10
chlorhexidine	13
chlorobenzene	36
chlorobenzothiazole, 2-amino-4-	23
chlorpheniramine maleate	30
chlorpromazine	22
chlortetracycline	22
chlorzoxazone	17
chrysene	25
chyrsin	39
ciprofloxacin	14
citalopram	12
citalopram N-oxide	12
citrulline, OPA-	8
clenbuterol	21
clindamycin	13
clodronate	15
clomipramine	12
clomipramine, 8-OH-	12
clomipramine, 8-OH-desmethyl-	12
clomipramine, desmethyl-	12
clorodonate monophenylester	15
clotrimazole	10
clozapine	14
codeine	30
cotinine	29
cyanazine	24
cyanidin	9
cyanidin-3-O-β-glycoside	9
cyclohexylalanine	7
cystein-conjugate (RPR 100391)	11
cysteine, Fmoc-	6
cysteine, PTC-	6
cysteyl neospiramycin I	21
cysteyl neospiramycin III	21
cysteyl spiramycin I	21
cysteyl spiramycin III	21
cystine, Fmoc-	6
daidzein	39
D-Ala-Gly-Phe-Met-NH_2	31
DEA	24
DEA (desethylatrazine)	24
delphinidin-3-O-β-glycoside	9
demethyltramadol, o-	22
desethylatrazine	24
desisopropylatrazine	24
desmethylcitalopram	12
dexamethasone	21
DHET, 11,12-	15
DHET, 12,15-	15
DHET, 14,15-	15
DHET, 5,6-	15
DHET, 8,9-	15
DIA	24
DIA (desisopropylatrazine)	24
dibenzo(a,h)anthracene	25
dichlorobenzene, m-	36
dichlorobenzene, p-	36
dichlorobenzithiazole, 2,4-	23
didesmethylcitalopram	12
diethylaniline, N,N-	38
difenzoquat	25
dihydroxybenzylamine hydrobromide, 3-4-	14
dimethylamino-3-propyl thiomethylene-5-virginiamycin S (internal standard)	11
dimethyluric acid, 1,3-	28
dimethyluric acid, 1,7-	28
dinitrophenol, 2,3-	24
dinitrophenol, 2,4-	24
dinitrophenol, 2,5-	24
dinitrophenol, 2,6-	24
dinitrophenol, 3,4-	24
diphentoin	11
diquat	25
diuron	24
DNB	23
DNT	23
DNT, 2A-	23
dopamine	14
doxepine	12

EET, 11,12- 15
EET, 14,15- 15
EET, 5,6- 15
EET, 8,9- 15
elaidic acid (phenacyl ester derivative) 37
enoxacin 20
epinephrine 14
ethyl viologen 25
ethylcinnamate 38
fluconazole 22
fluoranthene 25
fluorene 25
fluorenyl metylchloroformate, 9- 6
fluoro-2'-deoxyuridine, 5- 16
fluorobenzene 36
fluorouridine, 5- 16
fluoxetine 12
fluvoxamine 11
Fmoc-NH_2 6
Fmoc-OH 6
formic acid 37
formononetin 39
foscarnet 18
fotemustine 16
fructose 27
furazolidone 13
furfural 34
GABA, OPA-alanine, OPA- 8
galactose 27
gastrodin 30
gaultereside D1 28
gaultereside D2 28
gaultereside D3 28
genistein 39
ginkgolide A 29
ginkgolide B 29
ginkgolide C 29
glucose 26
glucose 27
glucosepentabenzoate 38
glutamate 7
glutamate, N-acetyl- 7
glutamic acid 7
glutamic acid, Fmoc- 6
glutamic acid, OPA- 8
glutamic acid, PTC- 6
glutamine, OPA- 8
glutathione-conjugate (RP 69012) 11
glycine 7
glycine, Fmoc- 6
glycine, OPA- 8
glycine, PTC- 6
guaiacol 34
H290-51 26
H290-39 26
haloperidol 22
heptylpyridine 35
hesperetin 39
HETE, 20- 15
hexabenzoyl mannitol 27
hexachlorobenzene 36
hexylpyridine 35
histamine 34
histidine, Fmoc- 6
histidine, N-acetyl- 7
histidine, OPA- 8
histidine, PTC- 6
HMX 23
hydroxybenzyl alcohol, p- 30
hydroxyl-4-chlorobenzothiazole, 2- 23
hydroxylbenzaldehyde, p- 30
hypoxanthine 7
hypoxanthine 36
ibuprofen 16
ibuprofen 17
imipramine 19
IMP 36
indeno(1,2,3-c,d)pyrene 25
inosine 7
inosine 36
insulin 32
insulin sensitizing agent DRF-2189 15
iodouracil, 5- 16
Irganox 1076 26
isobutyryl-L-carnitine 1-aminoanthraceneamide 8
isoleucine 7
isoleucine, Fmoc- 6
isoleucine, OPA- 8
isoleucine, PTC- 6
ketoprofen 16
ketoprofen 17
lactic acid 37
lactose 27
lactose, α- 27
lactulose 26
lauric acid, fluorescent ester of 37
leucin enkephalin 32
leucine 7
leucine, Fmoc- 6
leucine, OPA- 8
leucine, PTC- 6
leukotriene LTC4 16
leukotriene LTD4 16
leukotriene LTE4 16
leukotriene LTE4 17
leukotriene LTE4-sulfone 17
leukotriene LTE4-sulfoxide 17
leukotriene N-acetyl LTE4 17
linoleic acid (phenacyl ester derivative) 37
linolenic acid (phenacyl ester derivative) 37
linuron 24
lomefloxacin 20
loxapine 14
luteolin 39
lysine 7
lysine, Fmoc- 6
lysine, PTC- 6
lysine,OPA- 8
lysozyme 32
maltose 27
malvidin-3-O-β-glycoside 9
mannitol 26
mannose 27
maprotyline 11
megazol 17
melittin 32
meloxicam 17
metanephrine 14
methacycline 22
methansulfonyl-L-carnitine 1-aminoanthraceneamide 8
methionine 7
methionine enkephalin 32
methionine enkephalin (ME) 31
methionine enkephalinamide (MEA) 31
methionine, Fmoc- 6
methionine, PTC- 6
methomyl 24
methoxybenzylamine hydrochloride, 4-hydroxy-3- 14
methyl tricarbonyl cyclopentadienyl tungsten 39
methylamine 34
methylbenzene 35
methylbenzoate 38
methyl-D-glucose,3-O- 27
methyldopamine,3-O- 14
methyl-p-hydroxybenzoate 35
methyluric acid, 1- 28
methyluric acid, 7- 28
methylxanthine, 1- 28
methylxanthine, 3- 28
methylxanthine, 7- 28
metolachlor 24
metoxuron 24
metribuzin 24
metronidazole 10
metronidazole 13
mianserine 11
minocycline 22
MNX 23
myristic acid (phenacyl ester derivative) 37
N-acetylaspartate (NAA) 7
N-acetylglutamate (NAG) 7
nalidixic acid 13
naphtalene 25
naphtalene 35
naringenin 39
naringin 39
NBA, 4- 23
neburon 24
NH_3^+ R 34
nicotinamide 33
nicotine 29
nitrobenzene 36
nitrobenzene 38
nitrobenzoic acid, o- 35
nitrobenzoic acid, m- 35
nitrobenzoic acid, o- 35
nitrobenzoic acid, p- 35
nitrophenol, 2- 24
nitrophenol, 3- 24
nitrophenol, 4- 18
nitrophenol, 4- 24
nitrophenyl-β-D-glucuronide, 4- 18
nitrophenylacetic acid, 4- 28
nitrophenylacetonitrile, 4- 28
nitrotoluene, m- 35
nitrotoluene, o- 35
nitrotoluene, p- 35
norepinephrine 14
norfluoxetine 12
norleucine, PTC- 6
normetanephrine 14
nortriptyline 12
nortriptyline 19
nortriptyline, E-10-OH- 12
nortriptyline, Z-10-OH- 12
octyl alcohol, n- 39
octyl caproate, n- 39
ofloxacin 20
oleic acid (phenacyl ester derivative) 37
ornitine, OPA- 8
oxamyl 24
oxytetracycline 22
oxytocin 31
oxytocin 32
palmitic acid (phenacyl ester derivative) 37
palmitoleic acid (phenacyl ester derivative) 37
paracetamol 28
paracetamol 30

paraquat 25
paraxanthine 28
paroxetine 12
PAT-5A 18
pelargonidin-3-O-β-glycoside 9
pentabenzoyl mannitol 27
pentabenzoyl-D-glucose 27
pentachlorobenzene 36
peonidin-3-O-β-glycoside 9
petunidin-3-O-β-glycoside 9
Phe 31
Phe-Met 31
phenanthrene 25
phenanthrene 35
phenobarbitone 11
phenol 24
phenylalanine 7
phenylalanine, Fmoc- 6
phenylalanine, OPA- 8
phenylalanine, PTC- 6
phenylephrine 30
phenylethanol, 2- 34
phenylethyl acetat, 2- 34
phenylpropanolamine 19
phenylpropanolamine hydrochloride 30
phosphonoformate 18
piperidine, (-)-trans-4-(4-fluorophenyl)-3-(3-hydroxy-4-methoxyphenoxymethyl)- 12
piperidine, (-)-trans-4-(4-fluorophenyl)-3-(4-hydroxy-3-methoxyphenoxymethyl)- 12
proline, Fmoc- 6
proline, PTC- 6
prometryn 24
propanamine (MDEA), N-ethyl-1-(1,3-benzodioxol-5-yl)-2- 15
propanamine (MDMA), N-methyl-1-(1,3-benzodioxol-5-yl)-2- 15
propane, 1,3-diamino- 34
propazine 24
propionyl-L-carnitine 1-amino-anthraceneamide 8
propionylpromazine 22
propyl-p-hydroxybenzoate 35
protriptyline 12
pseudoephedrine 30
purine 36
putrescine 34
pyrene 25
pyridoxine 33
pyridylacetonitrile, 3- 38
pyrimethamine 10
quercetin 39
quinoxaline 38
quinupristin (RP 57669) 11
RDX 23
resorcinol 24
retinol 33
rhamnose 27
rhamnose, L- 26
riboflavine 33
ribose 27
ritonavir 13
rutin 39
salicin 20
saquinavir 13
SCH 39370 (neutral metallo-endopeptidase inhibitor) 31
scopolamine 29
serine, Fmoc- 6
serine, OPA- 8
serine, PTC- 6
sildenafil (viagra) 20
simazine 24
sodium phenobarbital 16
sodium salicylate 30
sotolon 34
spermidine 34
spermine 34
sphinganine, OPA- 29
sphingosine, OPA- 29
spiramycin I 21
spiramycin III 21
spiramycin S 21
stearic acid (phenacyl ester derivative) 37
sucrose 27
sulfadimethoxine 10
sulfamethazine 10
sulfamethoxazole 10
sulfamethoxypyridazine 10
sulfaquinoxaline 10
sulfourea 35
tangeretin 39
terbinafine 13
tetrabenzoyl-D-glucose 27
tetrachlorobenzene, 1,2,3,4- 36
tetrachlorobenzene, 1,2,4,5- 36
tetraethyllead 23
tetramethyllead 23
theobromine 28
theophylline 11
theophylline 28
thiabendazole 23
thiamine chloride 33
thiazolidine-2,4-dione, 5[4-[N-(20pyridyl)-(2s)-pyrrolidine-2-methoxy]phenylmethylene], maleic acid salt 18
thiazolidinedione 18
threonine, Fmoc- 6
threonine, OPA- 8
threonine, PTC- 6
tinidazol 17
TNB 23
TNT 23
TNX 23
tocopherol, δ- 33
tocopherol, α- 33
tocopherol, γ- 33
toluene 19
toluene 35
toluene 36
toluene 38
tramadol 22
triacylglycerols 40
triamcinolone acetonide acetate 13
tricarbonyl cyclopentadienyl manganese 39
trichlorobenzene, 1,2,3- 36
trichlorobenzene, 1,2,4- 36
trichlorobenzene, 1,3,5- 36
triclosan 40
triglycerides from olive oil 40
trimethoprim 10
trimethylphosphine hydride dicarbonyl cyclopentadienyl molybdenum 39
trimipramine 11
triphenylphosphine hydride dicarbonyl cyclopentadienyl molybdenum 39
troglitazone 15
tryptamine 34
tryptophan, PTC- 6
tryptophane, Fmoc- 6
Tyr 31
tyramine 34
Tyr-D-Ala 31
Tyr-D-Ala-Gly 31
Tyr-D-Ala-Gly-Phe 31
tyrosine 7
tyrosine, Fmoc- 6
tyrosine, OPA- 8
tyrosine, PTC- 6
UK 103320 (viagra metabolite) 20
UK114542-27 20
uric acid 7
valine 7
valine, Fmoc- 6
valine, OPA- 8
valine, PTC- 6
vanillin 30
vanillin 34
vanillyl alcohol 30
vasopressin, 8-Arg- 31
vasopressin, d-4-Asn-8-D- 31
vasopressin, d-8-D-Arg- 31
vasotocin, 8-Arg- 31
viagra 20
vitamin A 33
vitamin B_1 33
vitamin B_2 33
vitamin B_3 33
vitamin B_6 33
vitamin C 33
vitamin E 33
xanthine 7
xylazine 22
xylose 27

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