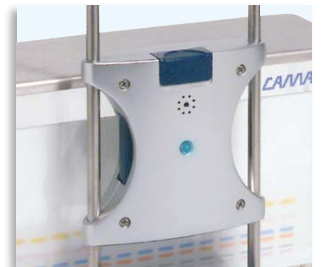
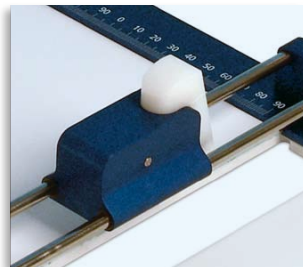


# CAMMAG

World leader in Planar Chromatography

## Basic Equipment for Modern Thin-Layer Chromatography





CAMAG has a tradition of service to Planar Chromatography since 1961. We develop and manufacture basic equipment, sophisticated instruments and software for this analytical technique.

We provide competent customer support and technical service for our products as well as education, training, application support and a range of contract laboratory services.

CAMAG has everything your lab may need for Planar Chromatography. This catalog focuses on the basic equipment suitable for your TLC/HPTLC application.

For further information on the full range of CAMAG products including instruments see our main catalogue or the special brochures.

Please visit our home page [www.camag.com](http://www.camag.com) for additional information and latest news.

## Important fields of application



### Clinical applications

- Lipids
- Metabolism studies
- Drug screening
- Doping control, etc.



### Cosmetics

- Identity of raw material
- Preservatives, colouring materials, etc.
- Screening for illegal substances, etc.



### Food and Feed stuff

- Quality control
- Additives (e. g. vitamins)
- Pesticides
- Stability tests (expiration), etc.



### Industrial applications

- Process development and optimization
- Process monitoring
- Cleaning validation, etc.



### Pharmaceutical applications

- Quality control
- Content Uniformity Test (CUT)
- Identity- and purity checks
- Stability tests, etc.



### Forensics

- Detection of document forgery
- Investigation of poisoning
- Dyestuff analyses, etc.



### Herbals

- Identification
- Stability tests
- Detection of adulteration
- Assay of marker compounds, etc.



### Environment

- Water
- Soil
- Residue analysis, etc.

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## The Steps of Planar Chromatography:

### Sample application, sample dosage

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The samples are applied onto the separation layer, either as spots through contact transfer or as narrow bands using the spray-on technique. Precision of applied volume, small size of application zone and exact positioning are essential for the quality of the analysis. Bandwise sample application as available with Linomat 5 or Automatic TLC Sampler 4 (ask for brochure) offers the best separation results and highest flexibility regarding sample solvents and application volumes. With spray-on technique the applied volume can be easily adjusted to match the required detection limit of the analytical task.

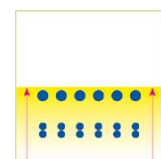


### Chromatogram development

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Drawn by capillary forces the developing solvent (mobile phase) migrates through the layer (stationary phase) over a defined distance. During this process the sample is separated into fractions (components). After evaporation of the mobile phase all fractions remain stored on the layer.

Special features: Almost unlimited choice of mobile phase and large selection of stationary phases.



### Derivatization

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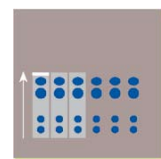
It is an inherent advantage of planar chromatography that fractions are stored on the plate and can be derivatized after chromatography. By derivatization, substances that do not respond to visible or UV light can be rendered detectable. In many cases, substances or classes of substances can be identified by specific reagents.

### Chromatogram evaluation

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The chromatogram is evaluated under ultraviolet or white light. Options range from visual inspection, electronic image processing, video densitometry and documentation to quantitative determination by means of monochromatic light in a classical densitometer, which additionally facilitates measurement of spectral information. Spectral information is available through the densitometer.

Special features: Multiple evaluation of the chromatogram with different parameters and detection methods. If necessary a derivatization step can be interposed.



### Optional Procedures

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UV-Inspection  
Postchromatographic Derivatization – Staining  
In-House Preparation of TLC Plates  
Precoated Layers

## Synonyms for Planar Chromatography

- Thin-Layer Chromatography (TLC) or High Performance Thin-Layer Chromatography (HPTLC)
- Modern Thin-Layer Chromatography
- Instrumental Thin-Layer Chromatography
- Planar Liquid Chromatography (PLC) (rarely used)

In order to emphasize the fact that the modern method is different from the simple thin-layer chromatography of yesterday, we are predominantly using "Planar Chromatography" but occasionally TLC or HPTLC as well.

## The System CAMAG Nanomat and Capillary Dispenser



The CAMAG Nanomat serves for easy application of samples onto TLC and HPTLC plates or sheets, in the form of spots, precisely positioned and without damage to the layer.

The actual sample dosage is performed with disposable capillary pipettes which are precisely guided by the Universal Capillary Holder.

The Nanomat is suitable for:

- Conventional TLC plates including self-coated plates up to 20 × 20cm
- HPTLC plates 10 × 10cm and 20 × 10cm
- TLC and HPTLC sheets up to 20 × 20cm.

Capillary pipettes are loaded into the dispenser in magazines. Capillaries of 0.5, 1, 2, and 5µL volume are available. Each capillary size requires an appropriate dispenser magazine.

With the Universal Capillary Holder capillary pipettes are taken from the dispenser, filled with sample solution and then placed against the applicator head of the Nanomat.

### Ordering information

- 022.4730 Nanomat 4, without Capillary Pipettes and holder
- 022.7650 Capillary Dispenser complete with Universal Capillary Holder 022.7786, one Dispenser Magazine 022.7661 for 1 µL Capillaries and one pack of 5 × 100 Disposable Capillary Pipettes 1 µL
- 022.7655 Capillary Dispenser, without Capillary Pipettes
- 022.7786 Universal Capillary Holder
- 022.7660 Dispenser Magazine for 0.5 µL Capillary Pipettes, without Capillaries
- 022.7661 Dispenser Magazine for 1.0 µL Capillary Pipettes, without Capillaries
- 022.7662 Dispenser Magazine for 2.0 µL Capillary Pipettes, without Capillaries
- 022.7665 Dispenser Magazine for 5.0 µL Capillary Pipettes, without Capillaries
- 022.7770 Disposable Capillary Pipettes 0.5 µL, pack of 5 × 100
- 022.7771 Disposable Capillary Pipettes 1.0 µL, pack of 5 × 100
- 022.7772 Disposable Capillary Pipettes 2.0 µL, pack of 5 × 100
- 022.7775 Disposable Capillary Pipettes 5.0 µL, pack of 5 × 100

## Alternative techniques for manual sample application

The tools presented here are intended for less demanding tasks in the TLC lab.

### Disposable glass capillaries

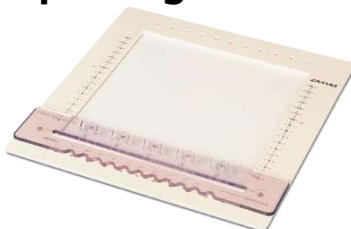


- Disposable glass capillaries for manual sample application of 0.5, 1, 2, or 5 µL
- color coded vials containing 100 pieces
- The capillaries are hand-held and can be positioned with the Multipurpose Spotting Guide.

#### Graduated disposable micropipettes

- Graduated in microliters, these 5 µL glass capillaries are suitable for qualitative analysis on conventional TLC layers

### Multipurpose Spotting Guide



- The CAMAG Multipurpose Spotting Guide is used for setting up chromatograms on conventional 20 × 20 cm layers
- The Multipurpose Spotting Guide can also be used in combination with the Capillary Dispenser system (see Nanomat 4) to make manual sample application more convenient.

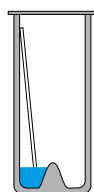
### Ordering information

- 022.7725 Disposable Capillaries 0.5 µL, vial of 100
- 022.7726 Disposable Capillaries 1.0 µL, vial of 100
- 022.7727 Disposable Capillaries 2.0 µL, vial of 100
- 022.7729 Disposable Capillaries 5.0 µL, vial of 100
- 022.7142 Graduated Disposable Micropipettes 5 µL, pack of 250
- 022.4230 CAMAG Multipurpose Spotting Guide for 20 × 20 cm plates, with scoring pin

# Chromatogram Development

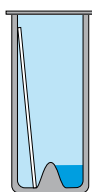
## Twin Trough Chamber

CAMAG Twin Trough chambers offer several ways to specifically affect the TLC/HPTLC separation in order to improve it.



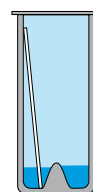
**Low solvent consumption**

20 mL of solvent is sufficient for the development of a 20×20 cm plate, 10 mL for a 20×10 cm, and 5 mL for a 10×10 cm HPTLC plate. This not only saves solvent, but also reduces the waste disposal problem.



**Reproducible pre-equilibration with solvent vapor**

For pre-equilibration, the TLC plate is placed in the empty trough opposite the trough, which contains the solvent. Equilibration can be performed with any liquid and for any period of time.



**Start of development**

Development is started only when developing solvent is introduced into the trough with the plate.

## Twin Trough Chamber

Twin Trough Chamber with stainless steel lid



## Twin Trough Chamber light-weight

Twin Trough Chamber light-weight with glass lid. Made from highly transparent sheet glass.



## Flat Bottom Chamber

The CAMAG Flat Bottom chamber permits the chromatogram to be developed under conditions of partial or complete saturation of the tank atmosphere with solvent vapors. The degree of layer pre-saturation can not be controlled unless additional accessories are used.

## Flat Bottom Chamber

Flat Bottom Chamber with stainless steel lid



## Flat Bottom Chamber light-weight

Flat Bottom Chamber light-weight with glass lid



### Ordering information

#### Twin Trough Chamber for 20×20 cm plates

022.5256 with stainless steel lid

022.5255 with glass lid

022.5258 without lid

#### Twin Trough Chamber for 20×10 cm plates

022.5254 with stainless steel lid

022.5253 with glass lid

022.5251 without lid

#### Twin Trough Chamber for 10×10 cm plates

022.5155 with stainless steel lid

022.5156 without lid

#### Twin Trough Chamber for 10×5 cm plates

022.5165 with stainless steel lid

022.5166 without lid

#### Twin Trough Chamber light-weight

022.5285 for 20×20 cm plates with glass lid

022.5280 for 20×10 cm plates with glass lid

#### Flat Bottom Chamber for 20×20 cm plates

022.5259 with stainless steel lid

022.5250 with glass lid

022.5257 without lid

#### Flat Bottom Chamber for 10×10 cm plates

022.5150 with stainless steel lid

022.5151 without lid

022.5265 Stainless steel lid to fit 20×20 cm and 20×10 cm chambers, not for lightweight chambers

022.5102 Stainless steel lid for 10×10 cm chambers

022.5252 Glass lid for 20×20 cm and 20×10 cm chambers (not for light-weight chambers)

#### Flat Bottom Chamber light-weight

022.5275 for 20×20 cm plates, with glass lid

022.5270 for 20×10 cm plates, with glass lid

022.5279 Glass lid for all light-weight chambers, 20×20 and 20×10 cm

## smartALERT Solvent Front Monitor

smartALERT for dependable monitoring of TLC/ HPTLC plate development in a glass development chamber.

- Guarantees that the developing distance will always be accurate and according to the method
- Gives acoustic and visual notice when the mobile phase has reached the desired developing distance
- Replaces the timer or stop watch
- Works with glass chambers for plate sizes 20 x 20 cm, 20 x 10 cm and 10 x 10 cm
- No wastes because of "over-developed" plates.

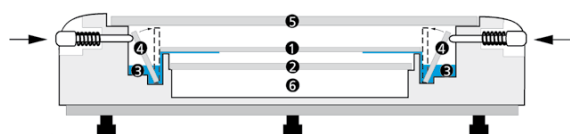


### Ordering information

022.5300 smartALERT Solvent Front Monitor

## Horizontal Developing Chamber

In the Horizontal Developing chamber, the HPTLC plate is developed from both opposing sides towards the middle. This permits the number of samples to be doubled as compared with development in a tank, provided the separation distance of 45 mm, i.e. 50 mm minus 5 mm distance from the edge, is sufficient. In the CAMAG Horizontal Developing chamber, a plate can be developed in the sandwich as well as in the tank configuration. The chamber is suitable for all kinds of solvents.



- 1 HPTLC plate (layer facing down)
- 2 Glass plate for sandwich configuration
- 3 Reservoir for developing solvent
- 4 Glass strip
- 5 Cover plate

### Ordering information

#### Horizontal Developing Chamber

022.8530 for 10x10 cm plates

022.8535 for 20x10 cm plates

## Saturation pads

These 20x20 cm sheets of thick filter paper are used to line the inner walls of a developing tank for saturating the chamber atmosphere with solvent vapors. They are suitable for all Flat Bottom and Twin Trough Chambers. These pads are also handy for many other uses in a TLC laboratory.

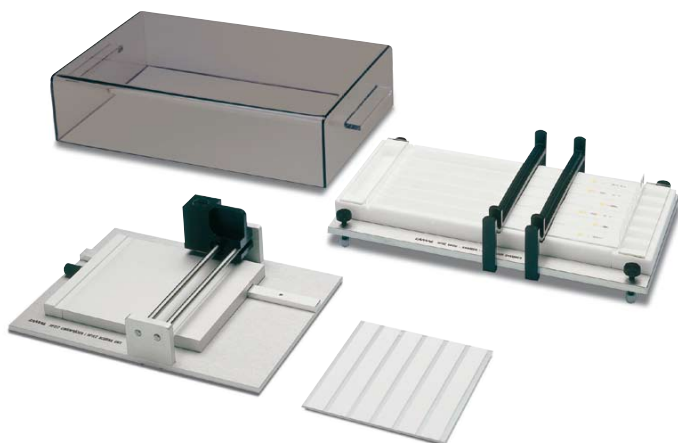
### Ordering information

022.5244 Saturation Pads, pack of 100

## HPTLC Vario System

### Key features:

- Development with six different solvents can be tested side by side.
- Sandwich as well as tank configuration can be simulated side by side, making results directly comparable.
- Six different conditions of pre-equilibration, including relative humidity, can be tested simultaneously.
- These variations of developing conditions can be freely combined.



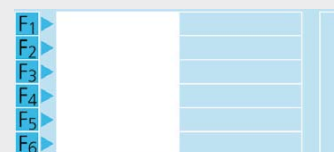
### Ordering information

- 022.8550 HPTLC VARIO System, comprising  
 022.8555 HPTLC VARIO Chamber for 10×10 cm plates, complete and  
 022.8556 HPTLC Scoring unit for the preparation of TLC/HPTLC plates  
 022.8558 Scoring blades for 022.8556, pack of 10

## Timesaving optimization of separation conditions using the HPTLC Vario System

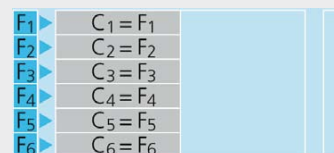
### Application examples, schematic

#### 1 Optimization of the developing solvent



Development with six different solvents side by side, without preconditioning = development in sandwich configuration.

#### 2 Optimization of the development solvent



Development with six different solvents side by side whereby the conditioning troughs contain the same six solvents = simulated tank development

#### 3 Optimization of the development solvent after uniform layer preconditioning



First step: pre-equilibration of all six tracks with the same conditioning liquid; then development with six different solvents (in sandwich configuration).

#### 4 Optimization of preconditioning



Pre-equilibration with six different conditioning liquids; then development of all tracks with the same solvent.

F1 ... = developing solvents C1 ... = conditioning liquids



## Chromatogram Immersion Device

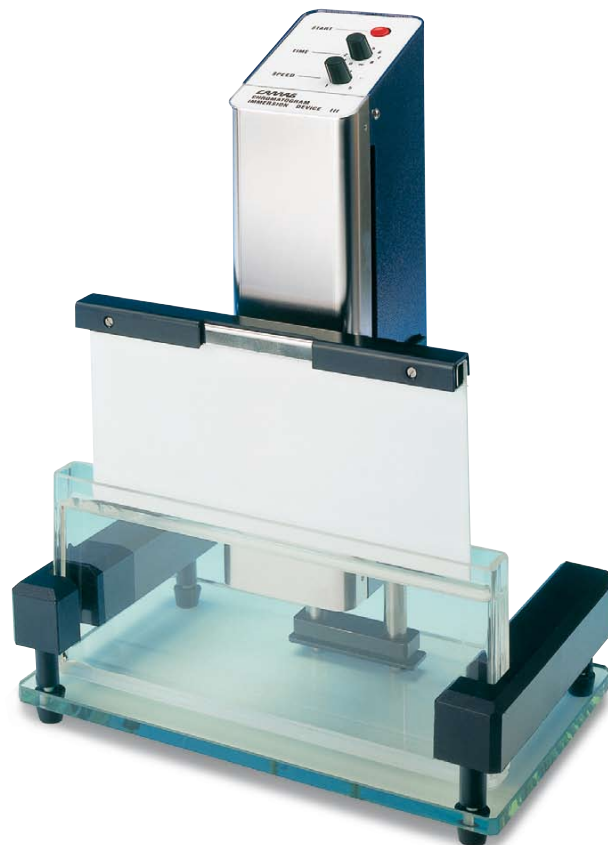
For proper execution of the dipping technique, the chromatogram must be immersed and withdrawn at a controlled uniform speed. By maintaining a well defined vertical speed and immersion time, derivatization conditions can be standardized and »tide marks«, which can interfere with densitometric evaluation, are avoided .

### Key features:

- Uniform vertical speed, freely selectable between 30 mm/s and 50 mm/s.
- Immersion time selectable between 1 and 8 seconds and indefinitely
- The device can be set to accommodate 10 cm and 20 cm plate height
- Battery operated, independent of power supply.

### Ordering information

- 022.6606 Chromatogram Immersion Device III for plates up to 20×20 cm, without dip tank
- 022.6627 Dip tank (sintered sheet glass) for plates 20×20 cm, with lid
- 022.6628 Dip tank (sintered sheet glass) for plates 20×10 cm, with lid
- 022.6622 Lid, polyethylene, for dip tanks 20×20 cm and 20×10 cm
- 022.6619 Bench top rack for three dip tanks



## TLC/HPTLC-Sprayer

The TLC/HPTLC Sprayer consists of a charger and a pump unit with two kinds of spray heads. Spray head type A is for spray solutions of normal viscosity, e.g. lower alcohol solutions; spray head type B is for liquids of higher viscosity, e.g. sulfuric acid reagents.

### Key features:

- Easy to use, with electro-pneumatic spray function
- Formation of fine aerosol with particles of 0.3 to 10 µm

### Ordering information

- 022.6530 TLC Sprayer comprised of charger unit, pump unit with bottle clamp and connecting tube, one each spray head type A and B, one each reagent bottle 100 mL and 50 mL with cap

### Spares and consumables:

- 022.6535 Pack of 5 spray heads type A and 1 type B
- 022.6538 Pack of 6 spray heads type B
- 022.6536 Reagent bottle 100 mL with cap, pack of 6
- 022.6537 Reagent bottle 50 mL with cap, pack of 6
- 022.6539 Service kit for TLC sprayer containing 2 compressed air connectors, 5 gaskets, 3 changeable filters, 1 bottle holder



## Reagent Sprayer (all glass)

This all glass reagent sprayer is a low cost yet efficient alternative to the TLC/HPTLC Sprayer. It comes with a rubber pump but may also be operated from a compressed air or nitrogen supply.

### Ordering information

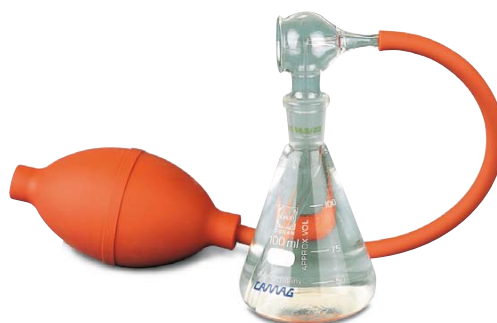
022.6100 Reagent Sprayer, all glass, with 100 mL Erlenmeyer flask

### Spare parts:

022.6101 Spray head for 022.6100

022.6102 Erlenmeyer flask for 022.6100

022.6103 Rubber pump for 022.6100



## TLC Spray Cabinet

The TLC Spray Cabinet ensures the complete removal of reagent mist while spraying TLC plates.

There is no deflection of the spray jet before it reaches the chromatogram, an effect often occurring in a normal laboratory fume hood.

The TLC Spray Cabinet is made of PVC.

The blower, a radial fan driven by a motor outside of the fume duct, produces an airflow of 130 cubic feet per minute. The bottom of the spray cabinet has a built in tray, which is removable for easy cleaning. Dimensions: 470 x 490 x 490 mm (width x depth x height)

### Ordering information

022.6230 TLC Spray Cabinet II with blower and 1.5 m flexible exhaust hose 127 mm Ø.

022.6232 TLC Spray Cabinet II without blower, with 1.5m flexible exhaust hose (for connection to an existing exhaust duct)

022.6226 exhaust hose extension 1.5 m with adapter



## TLC Plate Heater

The TLC Plate Heater is designed for heating TLC plates to a given temperature, while ensuring homogenous heating across the plate.

The TLC Plate Heater III has a CERAN® heating surface which is resistant to all common reagents and is easily cleaned. The 20 x 20 cm heating surface has a grid to facilitate correct positioning of the TLC plate.

Programmed and actual temperature are digitally displayed. The temperature is selectable between 25 and 200 °C. The plate heater is protected from overheating.

### Ordering information

022.3306 TLC Plate Heater III



## UV Cabinet



▲ UV Lamp in combination with UV Viewing Box (= UV Cabinet)

The UV Cabinet is suitable for inspecting thin-layer chromatograms and other objects in an undarkened room. The front of the box is closed with a roller shutter, which can be pushed open to the left or to the right as required for inserting or marking objects. A glass filter in the viewing window protects the eyes against reflected short-wave UV light. Great care has been taken to ensure the correct distances between UV lamp, object and the observer's eye in the interest of good illumination and untroubled viewing.

### Key features:

- Inspection of thin-layer chromatograms and other objects in an undarkened room
- A glass filter in the viewing window protects the eyes against reflected short-wave UV light
- Made from shock-resistant plastic
- Base measures 400×260 mm inside; outer dimensions 490×350×290 mm
- Compatible with all CAMAG UV lamps of the 022.91XX series.

## UV Lamps



▲ The UV lamps with stand are designed for use in a TLC laboratory.

The housing is made of anodized aluminum and of shock-resistant plastic. The lamp is operated on 12 V AC or DC power which is internally converted to 25–30 KHz high frequency. This ensures instantaneous illumination of the tubes at the selected wavelength as well as the absence of any »flickering«. In order to reduce the user's risk of exposure to UV radiation, the lamp is equipped with a timer that automatically turns off after 10 minutes.

The stand holds the lamp in a position optimized for viewing 20×20 cm objects. It shields off extraneous light on three sides. The lamp can be easily lifted off the stand and directed against a larger object.

### Key features:

- Two wavelengths, 254/366 nm
- Two light tubes 8 W each
- Shock resistant housing
- Dimension 442×76×43 mm
- Powered with 12 V AC from the mains adapter supplied with it or via an optional connecting cable from 12 V DC.
- Instantaneous ignition without flickering and optimum light efficiency due to operation at 25–30 KHz AC.
- Automatic switch off by timer after 10 min reduces the risk of exposure to radiation.

Hardly any TLC laboratory can be without the use of UV light for inspecting chromatograms.

Two types of ultraviolet light are required for inspecting thin-layer chromatograms:

- Long-wave UV light 366 nm:  
Under long-wave UV light substances that can be excited to fluoresce appear as bright spots, often differently colored, on a dark background. The sensitivity of this detection method increases with the intensity of the UV light and also as more visible light is eliminated.
- Short-wave UV light 254nm:  
Under 254 nm UV substances absorbing at that wavelength become visible, provided the TLC layer contains a fluorescent indicator, e.g. F254. These substances appear as dark spots on a bright background. UV intensity and complete elimination of visible light are less critical.

### Ordering information

- 022.9070 UV Cabinet consisting of:  
022.9120 UV-Lamp for two wave lengths 254/366nm, 2×8 W  
022.9055 CAMAG Viewing Box 3
- 022.9055 Viewing Box 3, for all UV lamps of the 022.91XX series
- 022.9120 UV Lamp dual wavelength, 254/366 nm, 8 W each
- 022.9110 UV Lamp short-wave UV, 254 nm, 2×8 W
- 022.9115 UV Lamp long-wave UV, 366 nm, 2×8 W
- 022.9145 Stand for CAMAG UV Lamps
- 022.9146 Adapter for operating the cigarette lighter socket of a car

### Spare parts:

- 352.0010 Light tube short-wave UV, 254 nm, 8 W
- 352.0011 Light tube long-wave UV, 366 nm, 8 W
- 692.0042 UV Filter glass for UV lamps of the 022.91XX series

# TLC/HPTLC Precoated Layers

## MERCK Precoated Layers for High Performance Thin-Layer Chromatography («HPTLC»)

Performing thin-layer chromatographic separation on HPTLC layers has several advantages over those on conventional layers:

- Higher resolution of zones due to higher number of theoretical plates
- Shorter developing times
- Less solvent consumption
- Less background noise due to narrow size distribution of particles

However, suitable instruments are required to get the best results.

In most cases instrumental thin-layer chromatography utilizes precoated layers. Not only are they more convenient, their quality is far superior to that of layers prepared from the adsorbents available for self-coating. The precoated layers have a smoother and more durable surface.



The following list contains a selection of the most common precoated plates and sheets manufactured by E. MERCK. However all MERCK TLC/HPTLC plates and sheets can be ordered through CAMAG.

	<i>layer (<math>\mu\text{m}</math>)</i>	<i>size (cm)</i>	<i>quantity per pack</i>
034.5631 HPTLC plates silica gel 60 (without F) .....	200	10×10	25
034.5633 HPTLC plates silica gel 60 (without F) .....	200	10×10	100
034.5641 HPTLC plates silica gel 60 (without F) .....	200	20×10	50
034.5628 HPTLC plates silica gel 60 F 254 .....	200	10×10	25
034.5629 HPTLC plates silica gel 60 F 254 .....	200	10×10	100
034.5642 HPTLC plates silica gel 60 F 254 .....	200	20×10	50
034.5648 HPTLC plates silica gel 60 F 254, ultra pure for pharmacopoeial methods .....	200	20×10	50
034.5613 HPTLC plates silica gel 60 F 254 GLP .....	200	20×10	25
034.1552 HPTLC plates silica gel 60 WR F 254s .....	200	20×10	25
034.5445 HPTLC plates LiChrospher® Si 60 F 254s .....	180	20×10	25
034.5647B HPTLC plates LiChrospher® Si 60 WRF 254s .....	100	20×10	25
034.5547 HPTLC aluminium sheets silica gel 60 (without F) ...	200	20×20	25
034.5548 HPTLC aluminium sheets silica gel 60 F 254 .....	200	20×20	25
034.3726 HPTLC plates RP-2 F 254s .....	200	10×10	25
034.3725 HPTLC plates RP-8 F 254s .....	200	10×10	25
034.3124 HPTLC plates RP-18 W F 254s .....	200	10×10	25
034.3724 HPTLC plates RP-18 F 254s .....	200	10×10	25
034.6464 HPTLC plates CN F 254s .....	200	10×10	25
034.2668 HPTLC plates Diol F 254 .....	200	10×10	25
034.5647A HPTLC plates NH2 F 254s .....	200	10×10	25

## MERCK Pre-coated Layers for (conventional) TLC

	<i>layer (<math>\mu\text{m}</math>)</i>	<i>size (cm)</i>	<i>quantity. per pack</i>
034.5721 TLC plates silica gel (without F) .....	250	20×20	25
034.5729 TLC plates silica gel 60 F 254 .....	250	10×20	50
034.5715 TLC plates silica gell 60 F 254 .....	250	20×20	25
034.1798 TLC plates silica gel 60 F 254, concentration zone .....	250	20×20	25
034.5554 TLC aluminium sheets silica gel 60 F 254 .....	200	20×20	25
034.5559 TLC aluminium sheets RP-18 F 254s .....	200	20×20	20
034.5804 LuxPlate Si 60 F254 .....	250	20×10	50
034.5805 LuxPlate Si 60 F254 .....	250	20×20	25

This selection of Merck precoated plates represents only a selection of frequently used plates. The complete line of Merck precoated plates can be found at [www.tlc.merck.de](http://www.tlc.merck.de). On request CAMAG can deliver any plate from the Merck line.

## Automatic TLC Plate Coater

The glass plates to be coated are conveyed underneath a hopper filled with the adsorbent suspension. The layer thickness is determined by either a fixed gate with pre-set spacers or by a gate with adjustable distance.

The plates are moved by a motorized conveying system at a uniform feeding rate of 10 cm/s, to ensure a uniform layer. The Automatic TLC Plate Coater is supplied with a fixed gate for pre-set layers of 300 and 500 microns, an adjustable gate for layer thicknesses 0–2mm, and one plate holder for eight 20×20 cm plates.



## TLC Plate Coater, hand operated

The manual plate coater functions in the same manner as the automatic coater, except with this model the plates are pushed through by hand, one after the other and lifted off on the other side. The TLC Plate Coater is shipped with a fixed gate for pre-set layers of 300 and 500 microns and an adjustable gate for layer thicknesses 0–2 mm.



### Ordering information

- 022.1602 Automatic TLC Plate Coater
  - 022.1612 Additional Plate Holder for 022.1602
  - 022.1251 TLC Plate Coater, hand operated
  - 022.1216 Fixed Gate, special, two thicknesses up to 1 mm\*
  - 022.1217 Fixed Gate, special, two thicknesses one or both 1 mm up to 2 mm\*
- \*when ordering please specify thickness for each side

## Complete systems for in-house preparation of TLC plates

The following plate coating packages have been carefully composed so that you can immediately start in-house preparation of conventional TLC plates.

### Ordering information

- 022.0260 CAMAG TLC Package »Plate Coating Automatic«, containing:
  - 022.1602 Automatic TLC Plate Coater
  - 3× 022.2200 Glass Plates 20×20 cm, pack of 10
  - 2× 022.3250 TLC Plate Box
  - 032.3401 Aluminum Oxide CAMAG DSF-O, 1 kg
  - 032.3562 Cellulose CAMAG DSF-O, 500 g
  - 033.7730 Silica Gel MERCK GF 254, type 60, 1 kg
- 022.0265 CAMAG TLC Package »Plate Coating Manual«, containing:
  - 022.1251 TLC Plate Coater, hand operated
  - 2× 022.2200 Glass Plates 20×20 cm, pack of 10
  - 022.3250 TLC Plate Box
  - 032.3401 Aluminum Oxide CAMAG DSF-O, 1 kg
  - 032.3562 Cellulose CAMAG DSF-O, 500 g
  - 033.7730 Silica Gel MERCK GF 254, type 60, 1 kg

## Glass plates for Thin-Layer Chromatography

Glass plates with polished edges, about 4 mm thick

### Ordering information

- 022.2200 Glass Plates 20×20 cm, pack of 10
- 022.2100 Glass Plates 10×20 cm, pack of 10



# In-House Preparation of TLC Plates



## smartCUT Plate Cutter

Cuts plates with a thickness up to 3 mm

- Does not damage the sensitive layer
- Easy to handle.
- Read the required size from the scale directly
- Helps saving costs on precoated plates of high quality by preventing offcuts.

### Ordering information

022.4300 smartCUT Plate Cutter

115.4305 Spare cutter



## Drying Rack

The Drying Rack consists of ten individual aluminum trays, 20×20 cm, which can be stacked quickly and conveniently. A tin box for storing the trays and two wire handles, to move the stack while hot, are supplied.

The Drying Rack is convenient to use, particularly when TLC plates are prepared with the automatic plate coater in large runs. The Drying Rack also comes in handy for plates smaller than 20×20 cm.

### Ordering information

022.3200 Drying Rack



## TLC Plate Box

The TLC Plate Box holds ten 20×20 cm plates. The body with slide rails, the handle, and the removable bottom are all made of stainless steel. The cover is of transparent plastic. When used for drying coated TLC plates, the bottom and the cover are removed to increase air circulation.

The TLC Plate Box is also recommended to re-activate 20×20 cm pre-coated plates, e.g. after they have been pre-washed.

### Ordering information

022.3250 TLC Plate Box

## Test Dye Mixtures

Test dye mixtures are useful for functional checks on individual steps in the TLC procedure and for studying the influence of specific parameters.



### Ordering information

#### CAMAG offers three different test dye mixtures:

032.8001 Test Dye Mixture I 100 mL Dimethyl yellow – Oracet blue 2R – Oracet red G;  
solvent: toluene

032.8002 Test Dye Mixture II 100 mL (especially for aluminum oxide) Sudan black – Artisil blue – Sudan yellow – fatty orange – fat red 7B (Sudan black separates into two fractions);  
solvent: toluene

032.8003 Test Dye Mixture III 10 mL (suitable for HPTLC silica gel) Ciba F II – Indophenol – Ariabel red – Sudan blue II – Sudan IV – dimethylaminoazobenzene;  
solvent: toluene

## Adsorbents for In-House Preparation of TLC Layers



For the self preparation of chromatographic layers, adsorbents in the form of powder are mixed with water or with aqueous solutions of salts or buffering compounds to form a thick slurry which is spread onto glass plates by means of a coating device.

Adding calcium sulfate as a "binder" makes it easier to achieve the correct consistency of the slurry for coating; the calcium sulfate contributes very little to the mechanical strength of the layer.

A fluorescence indicator is required to visualize substances which absorb UV light of a wavelength (254 nm), by which the indicator is excited to emit visible light. Such substances appear as dark spots on a bright background.

The fluorescence indicator does not interfere with the chromatographic separation, with any derivatization reactions, nor with densitometric evaluation. Most of these type indicators, however, lose their fluorescence on contact with acids. Fluorescence indicators which are stable against acids are only available in certain precoated layers.

CAMAG offers a wide range of TLC adsorbents of its own manufacture as well as products by E. MERCK. The following list contains a selection of the more common grades.

However, all MERCK TLC adsorbents may be ordered through CAMAG.

Ordering information	500 g	1 kg	2,5 kg	5 kg
<b>CAMAG Adsorbents</b>				
Aluminium Oxide CAMAG DS-0		032.3301		032.3305
Aluminium Oxide CAMAG DS-5		032.3351		032.3355
Aluminium Oxide CAMAG DSF-0		032.3401		032.3405
Aluminium Oxide CAMAG DSF-5		032.3451		032.3455
Cellulose, fibre type, CAMAG D-0	032.3502			
Cellulose, fibre type, CAMAG DF-0	032.3512			
Cellulose, microcrystalline, CAMAG DS-0	032.3552			
Cellulose, microcrystalline, CAMAG DSF-0	032.3562			
Silica Gel, CAMAG DS-0		032.1001		032.1005
Silica Gel, CAMAG DS-5		032.1051		032.1055
Silica Gel, CAMAG DSF-0		032.1101		032.1105
032.1151 Silica Gel, CAMAG DSF-5		032.1151		032.1155
<b>Ordering information</b>				
	500 g	1 kg	2,5 kg	5 kg
<b>MERCK Adsorbents</b>				
Aluminium Oxide MERCK G (type 60/E)	033.1090		033.1091	
Aluminium Oxide MERCK GF (type 60/E)	033.1092			
Aluminium Oxide MERCK H basic (type 60/E)	033.1085			
Aluminium Oxide MERCK HF basic (type 60/E)	033.1094			
Silica Gel MERCK G (type 60)		033.7731		033.7733
Silica Gel MERCK GF (type 60)		033.7730		033.7729
Silica Gel MERCK H (type 60)		033.7736	033.7738	
Silica Gel MERCK HF (type 60)	033.7745	033.7739		
Silica Gel MERCK HF 254 + 366 (type 60)		033.7741		
Silica Gel MERCK 60 HR "high purity"	033.7744			
Kieselguhr MERCK 60 G	033.8129			
<i>"F" = Fluorescence indicator – excitation wavelength 254 nm</i>				
<i>"F 254 + 366" = Fluorescence indicator – excitation wavelength 254 and 366 nm</i>				
<i>"G" = CaSO<sub>4</sub> (gypsum) – 13% in silica gel, 9% in aluminium oxide</i>				
<i>last digit: "5" = 5% CaSO<sub>4</sub> binder, "0" = 0% = no CaSO<sub>4</sub> binder</i>				

# Basic TLC/HPTLC Assemblies

## Basic kits

All CAMAG basic kits have been carefully composed so that the lab can start working with Thin-Layer Chromatography. These assemblies are configured to allow upgrading to a complete system for quantitative TLC by adding items at any time without making any tool redundant. The transition from conventional TLC material to so-called high-performance (HPTLC) layers is straightforward. Just add the appropriate instrumentation.



### Ordering information

#### 022.0216 TLC Basic Kit, including UV Cabinet for qualitative and quantitative TLC using conventional layers, consisting of:

- 022.4730 CAMAG Nanomat 4, without capillary pipettes and holder
- 022.7650 CAMAG Capillary Dispenser complete with Universal Capillary Holder 022.7786, one Dispenser Magazine for 1  $\mu\text{L}$  Capillary Pipettes 022.7661 and one pack of 5 $\times$ 100 Disposable Capillary Pipettes 1  $\mu\text{L}$  022.7771
- 022.7662 Dispenser Magazine for 2  $\mu\text{L}$  Capillary Pipettes
- 022.7665 Dispenser Magazine for 5  $\mu\text{L}$  Capillary Pipettes
- 022.7772 Disposable Capillary Pipettes 2  $\mu\text{L}$ , pack of 5 $\times$ 100
- 022.7775 Disposable Capillary Pipettes 5  $\mu\text{L}$ , pack of 5 $\times$ 100
- 2 x 022.5256 CAMAG Twin Trough Chamber 20 $\times$ 20 cm, with stainless steel lid
- 022.5300 smartALERT, solvent front monitor
- 022.5244 Saturation pads, pack of 100
- 022.6100 CAMAG Reagent Sprayer, all glass
- 034.5715 Precoated plates Merck Silica gel 60 F254, 20 $\times$ 20 cm, pack of 25
- 032.8001 CAMAG Test Dye Mixture I, 100 mL
- 022.9070 CAMAG UV Cabinet 3 consisting of 022.9120 UV Lamp dual wavelength, 254/366 nm, 8 W each

#### 022.0226 HPTLC Basic Kit, including UV Cabinet for qualitative and quantitative analyses using 10 $\times$ 10 cm HPTLC layers, consisting of:

- 022.4730 CAMAG Nanomat 4, without capillary pipettes and holder
- 022.7650 CAMAG Capillary Dispenser complete with Universal Capillary Holder 022.7786, one Dispenser Magazine for 1  $\mu\text{L}$  Capillaries Pipettes 022.7761 and one pack of 5 $\times$ 100 Disposable Capillary Pipettes 1  $\mu\text{L}$  022.7771
- 022.7660 Dispenser Magazine for 0.5  $\mu\text{L}$  capillaries
- 022.7770 Disposable Capillary Pipettes 0.5  $\mu\text{L}$ , pack of 5 $\times$ 100
- 2 x 022.5155 CAMAG Twin Trough Chamber 10 $\times$ 10 cm, with stainless steel lid
- 022.5300 smartALERT, solvent front monitor
- 022.8530 CAMAG Horizontal Developing Chamber 10 $\times$ 10 cm
- 022.5244 Saturation pads, pack of 100
- 022.6530 TLC/HPTLC Sprayer
- 034.5628 HPTLC plates Merck Silica gel 60 F254, 10 $\times$ 10 cm, pack of 25
- 032.8003 CAMAG Test Dye Mixture III, 10 mL
- 022.9070 CAMAG UV Cabinet 3 consisting of 022.9120 UV Lamp dual wavelength, 254/366nm, 8 W each





## CAMAG Laboratory Services

CAMAG-Laboratory offers professional HPTLC solutions for your analytical problem! The lab has over ten years experience in development of customized HPTLC methods. While focusing on the analysis of medicinal plants and products derived thereof, expertise is also provided in HPTLC of pharmaceuticals, food and beverages as well as environmental and forensic samples.

Services include:

### 1) Method development and validation

Depending on the analytical goal qualitative and quantitative methods are developed from scratch. Existing methods can be customized or optimized.

### 2) Feasibility studies

Following a detailed discussion of the analytical goal the lab can evaluate whether HPTLC or TLC is a potential solution. Costs per sample and general performance of a method during routine use are estimated. Information obtained during the experimental work can be transferred to method development.

### 3) Contract analyses

Your samples are analyzed by HPTLC according to an existing method, e.g. AOAC, USP, PhEur, BHP, PHHelv, PHPRCh, AHP, etc. in an ISO 17025 or GMP compliant environment. CAMAG-Laboratory can also work according to your in-house method or employ their own validated methods. In any case an analytical report is generated for each project.

### 4) Consulting and training

CAMAG helps you get started! Whether it is setting up a small lab, ensuring compliance with cGMP, or dealing with the authorities concerning registration, we can offer HPTLC solutions that save you time, hassle and money.

Select one of our courses or let us provide customized training at your site to stay up to date with new developments in HPTLC methodology and technology. Let us show you how to properly use your equipment, get reliable results, and develop and validate methods yourself.

### 5) Applied research

We provide opportunities to local<sup>1</sup> students, scholars, and researchers to engage in research projects at our facilities. Our non-profit projects are focused on, but are not limited to practical aspects of modern HPTLC and analysis of botanicals. We publish results in journals, textbooks, through conferences and seminars as well as on our website. It is our goal to make available to the public high quality data illustrating the capabilities of HPTLC.

<sup>1</sup>Greater Basel area

Further information about our services is available on the Internet: [www.camag.com/laboratory](http://www.camag.com/laboratory) and by Phone: +41 61 467 34 34, Fax: +41 61 461 07 02 or email: [lab@camag.com](mailto:lab@camag.com)

## Education and training

CAMAG Laboratory Services is also your partner when it comes to education and training in the field of thin-layer chromatography.

In Muttenz we offer courses on the following subjects:

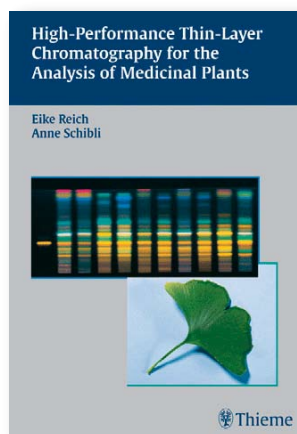
- Introduction to modern thin-layer chromatography
- Method development
- HPTLC for the analysis of botanicals
- HPTLC for the pharmaceutical industry
- Automated multiple development (AMD).

The current course dates are available on the Internet at:

[www.camag.com/courses](http://www.camag.com/courses). For special topics as well as for instrument and software training we can arrange individual trainings for you.

## High-Performance Thin-Layer Chromatography for the Analysis of Medicinal Plants

A complete reference for establishing the identity and quality of botanical products



### Features:

- Practical examples provided by renowned experts help the reader gain a firm understanding of HPTLC methodologies
- More than 300 full-color images and illustrations aid comprehension of complex concepts
- Easy-to-reference text boxes provide summaries of key information – ideal for rapid review
- Discussion of the development and validation of new HPTLC methods

**Eike Reich**, PhD, Head of Laboratory, CAMAG Muttenz, Switzerland, and **Anne Schibli**, MsPharm, Assistant Head of Quality Control, SwissCo Services AG, Sisseln, Switzerland

2006, 344 pages/332 illustrated, hardcover, ISBN 3-13-141601-7

### Ordering information

995.0040 Book "HPTLC for the Analysis of Medicinal Plants", Reich/Schibli

## Application notes

CAMAG application notes describe complete solutions for specific analytical problems. In addition they can serve as guide towards solutions for similar tasks. To ensure the best results possible, the application notes include detailed information on:

- Scope and analytical task
- Sample preparation
- Sample application
- Chromatographic conditions
- Post chromatographic derivatization
- Chromatogram evaluation with results.

The following applications were recently developed:

### Quantitative Determinations

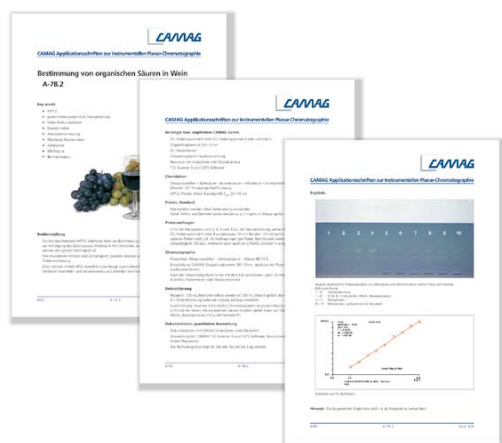
- A-14.4 Acetylsalicylic acid, salicylic acid, and salicyl amide
- A-41.3 Glycerol in tobacco
- A-78.2 Organic acids in wine
- A-81.2 Oligosaccharides in molasses
- A-83.1 Determination of sucralose and fructose in food and drinks
- A-84.1 Determination of tetrandrin in *Stephania tetrandra*

### Validated Methods

We develop and validate reliable HPTLC methods for the identification of botanical raw materials and finished products. By following our validated methods reproducible results and comparable analyses are achieved which guarantee for an unflinching quality control.

Currently ten validated methods are available, more are to come. Please contact [lab@camag.com](mailto:lab@camag.com) for the validated methods or the validation protocol.

- MOA 001 Green tea
- MOA 002 Ginseng
- MOA 003 Eleuthero
- MOA 004 Echinacea
- MOA 005 Cimicifuga
- MOA 006 Licorice
- MOA 007 Kava
- MOA 008 Milk Thistle
- MOA 009 Feverfew
- MOA 010 Ginger



## HPTLC Fingerprint analysis of Herbals

For reliable identification of herbal drugs we offer free of charge a large number of approved methods. On two pages each you will find information regarding sample preparation and chromatographic separation as well as images of the resulting chromatograms.

The following applications were recently developed:

### HPTLC Fingerprints for the identification of ...

- F-21 Han fangji (*Stephania tetrandra*)
- F-22A Red Clover (*Trifolium pratense*): Flavonoids
- F-22B Red Clover (*Trifolium pratense*): Formononetin
- F-23 Chinese plants with respect to aristolochic acids
- F-24A Echinacea (*E. purpurea*, *E. pallida*, *E. angustifolia*): Phenylpropanoids
- F-24B Echinacea (*E. purpurea*, *E. pallida*, *E. angustifolia*): Alkylamides
- F-25 Kava (*Piper methysticum*)
- F-26A Saw Palmetto (*Serenoa repens*): Ph.Eur.4
- F-26B Saw Palmetto (*Serenoa repens*): fatty oils
- F-27 Plantain (*Plantago lanceolata*)
- F-28 Lime flowers (*Tilia sp.*)
- F-29A Licorice (*Glycyrrhiza sp.*): polar compounds
- F-29B Licorice (*Glycyrrhiza sp.*): lipophilic compounds
- F-30 Eleuthero (*Eleutherococcus senticosus*)
- F-31 Asian Ginseng (*Panax ginseng*)
- F-32 American Ginseng (*Panax quinquefolium*)



All methods and application notes can be found on the Internet under: [www.camag.com/applications](http://www.camag.com/applications) and [www.camag.com/herbals](http://www.camag.com/herbals)

## CAMAG Bibliography Service »CBS«

CAMAG has been publishing this unique bulletin on Thin-layer Chromatography publications regularly since 1965. It appears twice a year, usually in March and September and is available to CAMAG customers at no charge. The literature abstracts of the current CBS issue can also be accessed on the internet.

A »CBS« abstract contains – if quoted in the original publication:

- Name(s) of author(s)
- Address of corresponding author
- Original title, if in one of the common Western hemisphere languages
- English translation of non-English title
- Publication details
- Brief abstract of the TLC related content with particular reference to separation systems, detection methods, quantification, results, etc.
- Key words.

The purpose of the »CBS« is to inform readers about the existence of papers in their particular TLC field of interest.

Reprints or photocopies of papers abstracted in the CBS are not available from CAMAG.

## CUMULATIVE CAMAG BIBLIOGRAPHY SERVICE »CCBS«


The most comprehensive compilation of TLC literature is now available as database. It includes all abstracts published since May 1983 that means TLC/HPTLC publications since 1982. It is updated after every regular CBS issue. At time of print of this catalog it contains about 8500 abstracts.

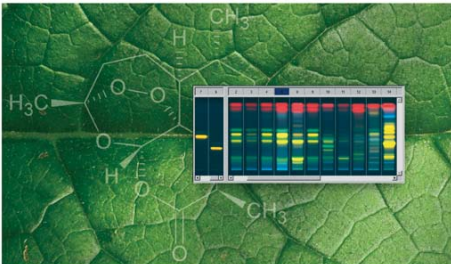
The most recent version of CCBS is available free of charge for download from our Internet site [www.camag.com](http://www.camag.com). Alternatively it can be requested from CAMAG on CD-ROM.

With the CCBS database you can now carry out your own exhaustive TLC/HPTLC literature search:



- Enter your search word, e.g. an author's name, a substance, a technique, a reagent or a term from amongst the key words of the abstract.
- Start the search routine.
- The abstracts in which the key word occurs appear separately and in sequence on the screen together with an indication of the total number of abstracts in which the search word was found.
- From the result you can print out selected abstracts.


CAMAG BIBLIOGRAPHY SERVICE • PLANAR CHROMATOGRAPHY CBS 99 • September 2007





**Analysis of herbals using  
Planar Chromatography – one step ahead  
due to its image feature**





CAMAG Bibliography Service

Excerpts from CBS 51 - 96 • Keyword:

**Special techniques**

G. MORLOCK\*, S. HÄBERLE, U. JAUTZ, W. SCHWACK (\* University of Hohenheim, Institute of Food Chemistry, Garbenstr. 28, 70599 Stuttgart, Germany, [gmorlock@uni-hohenheim.de](mailto:gmorlock@uni-hohenheim.de)). **New HPTLC-MS method for determination of heterocyclic aromatic amines.** CBS **93**, 14-15 (2004). HPTLC of heterocyclic aromatic amines on silica gel WRF (preshwashed with methanol by chromatography followed by drying at 120 °C for 30 min) with a 6 step gradient with diethyl ether, methanol and chloroform, with alkaline conditioning via gas phase over max. 60 mm. Quantitative determination by multi-wavelength scan in absorbance mode at 252, 262, 316 nm and fluorescence measurement at 366/>400 nm. Polynomial evaluation via peak area and height. Limit of quantitation is between 1-45 ng absolute on the plate. Online coupling with MS by use of a new extractor developed by Luttmann.

food analysis, AMD, HPTLC, densitometry, quantitative analysis, heterocyclic aromatic amines


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**CAMAG high performance instruments for Planar Chromatography not listed in this catalog:**

**Sample Application**

- Linomat 5
- Automatic TLC Sampler 4 (ATS 4)

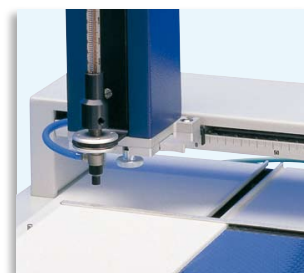
**Chromatogram Development**

- Automatic Multiple Development (AMD 2)
- Automatic Developing Chamber (ADC 2)

**Evaluation and Documentation**

- TLC Scanner 3
- DigiStore

For detailed information visit [www.camag.com](http://www.camag.com)



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