Supelco®
Analytical Products

MilliporeSigma

Thin-Layer Chromatography

TLC, HPTLC, TLC-MS, and Accessories

The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the U.S. and Canada.

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content

Key Applications

General Information

Ordering Information

Thin-Layer Chromatography (TLC)

Thin-layer chromatography (TLC) is a fast, easy-to-use, and highly versatile separation technique for qualitative and quantitative analysis, it is ideal for rapid identification of ingredients, screening and reaction monitoring. Its high matrix tolerance and the possibility to separate many samples in parallel makes TLC highly cost-efficient. In addition, multiple detection methods including visualization (derivatizations) and hyphenation to Mass Spectrometry (MS) enables a safe and precise identification of known and unknown compounds.

Some benefits of TLC:

- Disposable plates ensure simplified sample preparation
- Direct visualization of results by UV or derivatization
- Analysis of many samples under identical conditions simultaneously
- Easy two-dimensional separations
- Suitable for many applications, such as screening, rapid identity tests in drug synthesis, monitoring and easy upscaling for flash and preparative chromatography, and for quantitative analysis.
- Couple to MS or bioassays

Typical application fields for TLC include organic synthesis as well as fast identity testing in quality control.

In addition, TLC is an efficient tool for:

- Rapid analysis of ingredients in matrix-rich samples (e.g. QC in food or cosmetics)
- Fast screening of very complex samples (e.g. herbs or nutrition such as phytopharmaceuticals or forensics)
- A complementary method to verify correct results (e.g. cross-checking HPLC-results in pharmaceutical drug development or cosmetics)
- Rapid and high throughput pre-screening prior to HPLC

Furthermore TLC/HPTLC is well suited for:

- Full quantification of results using instrumental TLC/HPTLC
- Sample preparation for HPLC and other analytical methods
- Combination with mass spectrometry
- 2-dimensional chromatography
- Selective identification of compounds including biological activities

With our extensive history, experience, and know-how, we are the market leader in highest quality, reliable TLC & HPTLC plates and accessories. This gives you the peace of mind with regards to plate performance and reproducibility, enabling you to focus solely on your separation challenges.

Visit fishersci.com/supelco for further information.

Key Applications

Simple and Quick

Sucralose in Food

In food analysis we are often interested in only one or a few target compounds. But these compounds are present in many different samples, requiring different pre-treatments for quantitative analysis. TLC is an ideal method for rapid quantification of one or few target compounds from complex and matrix-rich samples of different nature. The target compound needs only to be clearly separated from all matrix of the sample to be quantified using a standard compound.

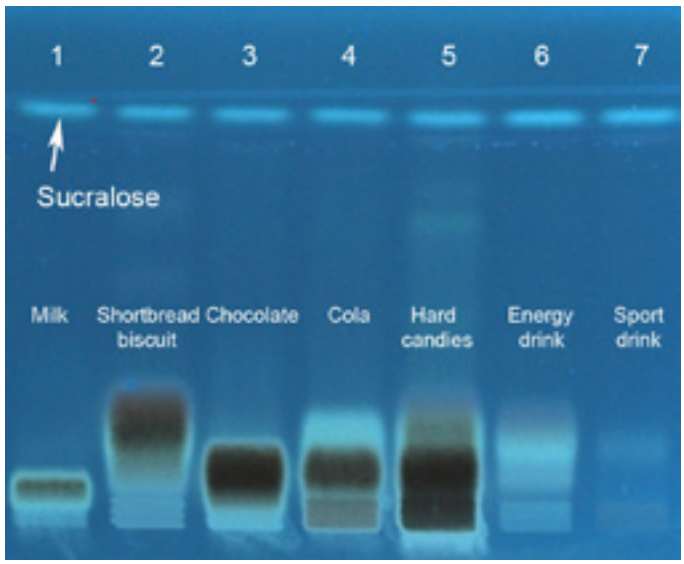
For the quantification of sucralose from different food samples, HPTLC was used without post-chromatographic derivatization. Forty-six chromatographic runs were performed in 40 minutes, thus the separation time per sample is less than 1 minute per sample.

Application data

Chromatography	Plate	HPTLC Silica gel 60 NH_2 F_{254} (20x10 cm)
	Sample preparation	The cake and biscuit samples were extracted with 70% aqueous methanol.
	Sample application	ATS 4 sample applicator (Camag), 6 mm bandwidth
	Application volume	2-4 µL
	Mobile phase	Acetonitrile / Water 17:3 (v/v)
	Migration distance	5 cm
	Migration time	1.8 min / 2.8 min
Detection	Documentation equipment	DigiStore2 (Camag)
	Wavelength	scan under UV-light at 366/>400 nm with TLC scanner 3 (Camag)
	Staining	none

Ordering information

Description	Mfr. No.
HPTLC Silica gel 60 NH_2 F_{254} MS-grade, 20x10 cm	**1.13192.0001**
Acetonitrile - gradient grade for liquid chromatography LiChrosolv® Reag. Ph Eur	**1.00030**
Water for chromatography (LC-MS Grade) LiChrosolv®	**1.15333**



G. Morlock, M. Vega, J. Planar Chromatogr. 20 (2007) 411-417

Fast and sensitive

Lactose in Milk with HPTLC-MS

Food intolerances are of increasing importance. In particular, lactose intolerance has recently gained a lot of attention not only in Asian countries, but also in Europe and North America.

Foodstuff with a lactose content of less than 100 mg/100 g could be labeled as “lactose-free”. Traditionally, analysis is carried out using photometric measurements in single cuvettes, or in 96-well plates by using an enzymatic test kit.

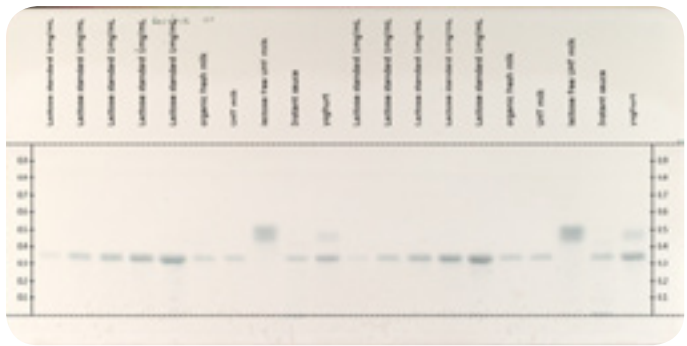
HPTLC coupled to MS enables much simpler and faster identification and quantification. Lactose in different samples like milk, yoghurt and an instant sauce can be analyzed in parallel without complex sample preparation.

Application data

Chromatography	Plate	HPTLC Silica gel 60 F_{254} MS-grade, 20x10 cm
	Sample preparation	Milk: 2 x 5 min centrifuged, then 1mL diluted in 50 mL water
		Yoghurt: 1 g diluted in 10 mL water, afterwards 1 x centrifuged rpm = 6000
		Instant sauce: sauce cooked as directed, 1 g sauce diluted in 10 mL water, afterwards 1 x 5 min centrifuged
	Sample application	ATS 4 sample applicator (Camag), 6 mm bandwidth
	Application volume	0.1 - 4 µL
	Mobile phase	Acetonitrile / Water 3/1 (v/v) + 0.1% Trifluoroacetic acid
	Migration distance	5 cm
	Migration time	12 min
Extraction	Extraction equipment	“TLC-MS Interface” from Camag
	Extraction solvent	Acetonitrile / Water 95/5 (v/v) + 0.1% Formic acid
	Extraction flow	0.2 mL/min
Detection	Documentation equipment	TLC Visualizer (Camag)
	Wavelength	scan at white light
	Staining	Aniline-diphenylamine-phosphoric acid reagent heated 10 min at 120 °C
	MS equipment	single-quadrupole mass spectrometer expression CMS (Advion)
	MS detection	ESI (+) mode (m/z 50 - 1200)

Ordering information

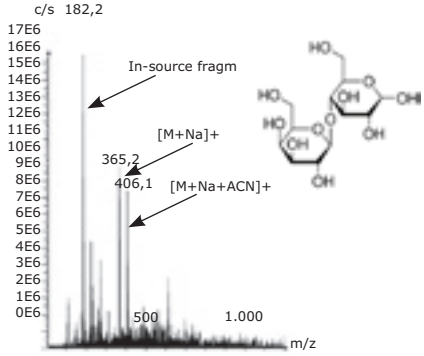
Description	Mfr. No.
HPTLC Silica gel 60 F254 MS-grade, 20x10 cm	**1.00934**
Acetonitrile hypergrade for LC-MS LiChrosolv®	**1.00029**
Trifluoroacetic acid for spectroscopy Uvasol®	**1.08262**
Diphenylamine for synthesis	**8.20528**
Aniline for analysis EMSURE®	**1.01261**
Ortho-Phosphoric acid for analysis EMSURE®	**1.00573**



Chromatogram (derivatized with Aniline-di-phenylamine-phosphoric acid reagent) under white light.

Determinded Lactose values

Organic fresh milk	4.68 g/100 g
UHT milk	4.36 g/100 g
Lactose free UHT milk	< 100 mg/100 g
Instant sauce	1.64 g/100 g
Yoghurt	5.49 g/100 g



Lactose

M = 342.3 g/mol

Mass spectrum of lactose-zone from yoghurt sample, eluted directly from the TLC plate

Robust and Accurate

UV Filter in Sun Cream using HPTLC-MS

Analytical verification of cosmetic products can be a challenging task. Formulations like creams, balms or lotions are complex matrices with respect to chromatography, so quick and simple sample preparation and a direct analysis method is appreciated. Thin-layer chromatography-mass spectrometry (TLC-MS) is such an analytical technique which allows the analysis of these complex samples with minimum sample preparation.

Application Data

Chromatography	Plate	HPTLC RP-18 $F_{254}S$ MS-grade, 20x10 cm
	Sample preparation	1 g Sun Cream stirred in 10 mL 2-propanol, filtration
	Sample application	ATS 4 sample applicator (CAMAG) 6 mm bandwidth
	Application volume	0.5 - 5 µl
	Mobile phase	Methanol / Acetonitrile 9/1 (v/v)
	Migration distance	5 cm
	Migration time	11 min
Extraction	Extraction equipment	"TLC-MS Interface" from CAMAG
	Extraction solvent	Acetonitrile / Water 95/5 (v/v) + 0.1% Formic acid
	Extraction flow	0.2 mL/min
Detection	Documentation equipment	Documentation unit Reprostar / Digistore (CAMAG)
	Wavelength	Scan under UV-light at 254 nm and 366 nm
	Staining	None
	MS equipment	ACQUITY Qda Detector, Single-Quadrupole Mass Spectrometer
	MS detection	ESI (+/-) mode MS (m/z 50-350)

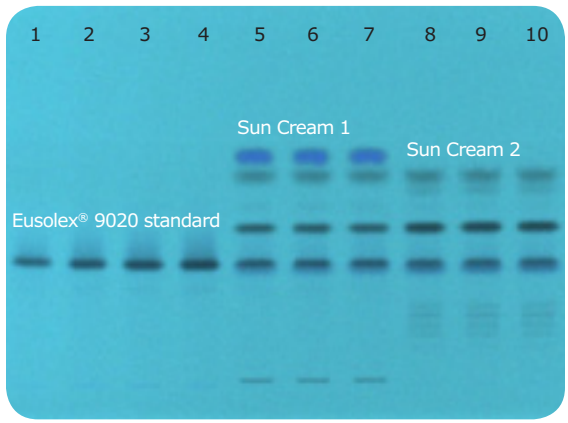


Fig. 2: Developed plate at 254 nm

Chromatographic date

Track	Compound	Concentration (mg/mL)	Application volume (µl)	hR_f	Detected mass m/z
1-4	Eusolex 9020 Standard	0.1	2, 3, 4, 5	50	311.2
5-7	Sun Cream#1	0.1	0.5	50	311.2
8-10	Sun Cream#2	0.1	0.5	50	311.2

Ordering information

Description	Mfr. No.
HPTLC RP-18 $F_{254}S$ MS-grade, 20x10 cm	**1.51161**
Acetonitrile hypergrade for LC-MS LiChrosolv®	**1.00029**
2-Propanol gradient grade for liquid chromatography LiChrosolv®	**1.01040**
Methanol for LC-MS LiChrosolv®	**1.06035**
Formic acid for analysis EMSURE®	**1.00264**
Water for chromatography (LC-MS Grade) LiChrosolv®	**1.15333**
Millex®-FH filter, 0.45 um hydrophobic, 25 mm, non sterile	**SLFH025NS**

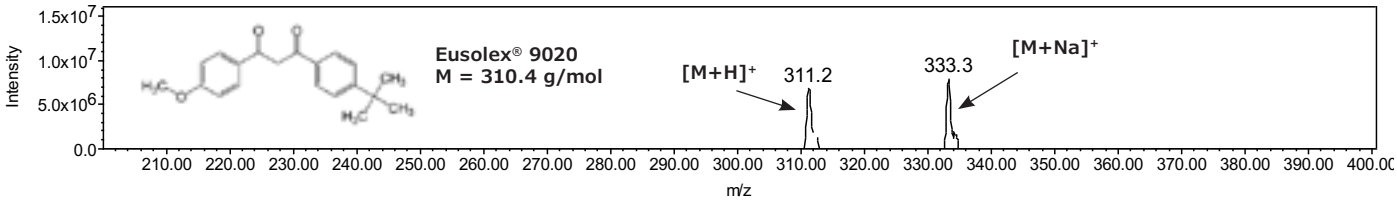


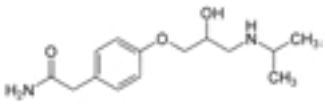
Fig. 1: Mass spectrum and structure of Eusolex® 9020, recorded at hR_f value of 50 at track 5.

Meet Regulations in Pharma

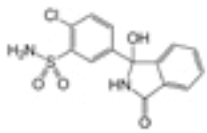
Identification Test for Atenolol and Chlorthalidone in Tablets following European Pharmacopeia Monograph

Atenolol is a selective β1 receptor antagonist, belonging to the group of beta blockers, a class of drugs used primarily in cardiovascular diseases.

Chlorthalidone is a diuretic drug used to treat hypertension, originally marketed as Hygroton in the USA. It is described as a thiazide diuretic, and often used in the management of hypertension and edema.

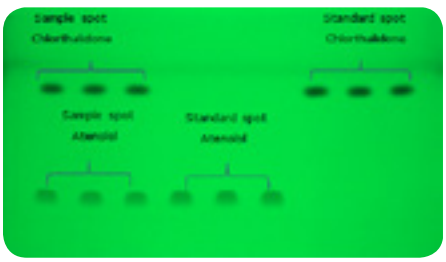


Atenolol



Chlorthalidone

Experimental Condition	
TLC Plate	Silica Gel 60 G F_{254}, 20 x 20 cm
Application volume	5 µL of each solution
Detection	UV @ 254 nm
Mobile phase	18 M Ammonia and n-butanol 30:150 (v/v)
Plate development	Line the walls of chromatographic tank with filter paper. Pour a sufficient quantity of mobile phase into the chromatographic tank. Saturate the chromatographic tank, replace the lid and allow to stand at 20-25°C for 1 hr. Apply the prescribed volume of the solutions in sufficiently small portions to obtain bands at an appropriate distance from the lower edge.
Migration distance	15 cm
Drying	in air
Standard	1.0 % (w/v) of atenolol in 0.25 % (w/v) of Chlorthalidone in methanol
Sample	Remove any film coating on the tablet powder and shake the quantity of powered tablet containing 0.1 g of atenolol with 10 mL of methanol for 15 minutes and filter.

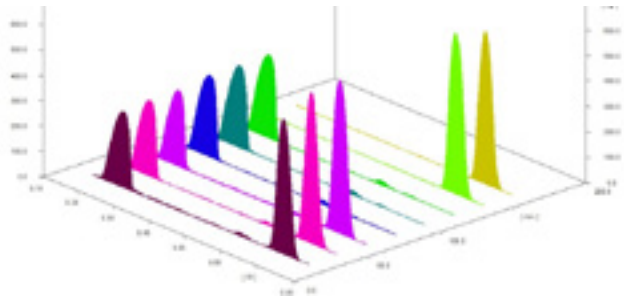


TLC Plate Development

With this application note we illustrate how silica gel G F_{254} plates are suitable for analysis of Atenolol and Chlorthalidone in a combination drug following the experimental conditions per the European Pharmacopeia identification TLC test for Atenolol (version 9.0).

Ordering information

Description	Mfr. No.
TLC Silica gel 60 G F_{254} 20 x 20 mm, glass plate, Pk.25	**1.00390**
1-Butanol for liquid chromatography LiChrosolv®	**1.01988**
Ammonia solution 25% Suprapur®	**1.05428**
Methanol gradient grade for liquid chromatography LiChrosolv® Reag. Ph Eur.	**1.06007**
Atenolol European Pharmacopoeia (EP) Reference Standard	**A1340000**
Atenolol Pharmaceutical Secondary Standard; Certified Reference Material	**PHR1909**
Chlorthalidone European Pharmacopoeia (EP) Reference Standard	**C1950000**



Regulated Method: Food & Beverage

Piperine in Black Pepper

Piperine is the spice and active component of black pepper, is able to influence drug metabolism.

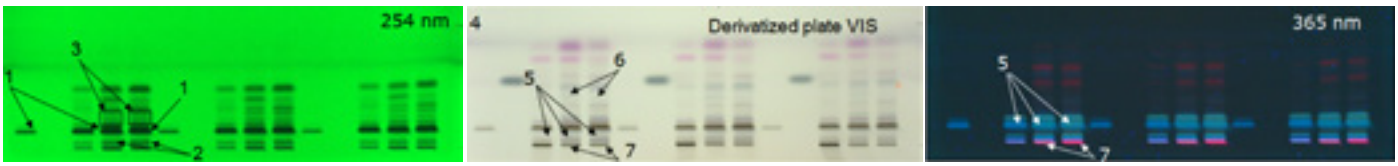
With a regulated method, one must follow the monograph instead of just putting the sample at the center of the decision making, so it is purely following the instructions in the monograph. In this application, we have chosen powdered black pepper as an example, and have tested it according to the United States Pharmacopeia (USP) guidelines (USP40-NF35).

Application data

Chromatography	Plate	HPTLC Silica gel 60 F_{254} (20x10 cm)
	Sample preparation	Sonicate for 10 min about 0.5 g of powdered black pepper in 5 mL of methanol, centrifuge and use the supernatant
	Sample application	ATS 4 sample applicator (Camag), 8 mm bandwidth
	Mobile phase	n-Hexane / Ethylacetate 5:3
	Migration distance	5 cm
Detection	Wave-length	scan under visible light, UV-light at 254 nm and 366 with TLC scanner 3 (Camag)
	Staining / Derivatiza-tion	A mixture of 17 mL of ice-cooled methanol, 2 mL of acetic acid, 1 mL of sulfuric acid and 0.1 mL of anisaldehyde

Featured Products

Description	Mfr. No.
TLC & HPLC	
HPLC glass plates Si 60 F_{254}, 20 x 10 cm	**1.05642**
Purospher® STAR RP-18 endcapped (5 µm) Hibar® RT 250-4.6	**1.51456**
Solvents & reagents	
Ethyl acetate for liquid chromatography LiChrosolv®	**1.00868**
n-Hexane for liquid chromatography LiChrosolv®	**1.04391**
Water for chromatography (LC-MS Grade) LiChrosolv®	**1.15333**
Acetonitrile - gradient grade for liquid chromatography LiChrosolv®, Reag. Ph Eur	**1.00030**
Methanol - gradient grade for liquid chromatography LiChrosolv®, Reag. Ph Eur	**1.06007**
Potassium dihydrogen phosphate anhydrous for HPLC LiChrosolv®	**5.43841**
ortho-Phosphoric acid 85% for HPLC LiChrosolv®	**5.43828**
Filtration	
Millex® syringe filter units, disposable, Durapore® PVDF, Pk. 1000	**SLHVX13NK**
Standards	
Piperine - United States Pharmacopoeia (USP) Reference Standard, 20 mg	**1.543200**
Powdered Black Pepper Extract - United States Pharmacopoeia (USP) Reference Standard, 1 g	**1.509019**



- Track 1: 3 µL standard solution A, USP reference standard (RS) of 0.9 mg/mL piperine in methanol.
- Track 2: 3 µL standard solution B, a 2 mg/mL borneol standard in methanol.
- Track 3: 15 µL standard solution C, USP powdered black pepper extract RS 5 mg/mL in methanol, sonicated, centrifuged, and the supernatant is used.
- Track 4 & 5: 7 µL two different commercial pepper samples of the same concentration taken through the same sample preparation steps. (add about 0.5 g of powdered black pepper to 5 mL of methanol, sonicate for 10 minutes, and then use the supernatant).

Application Results

1. Under 254 nm, the chromatogram of the sample solution exhibits an intense quenching band at Rf of about 0.15 corresponding to the piperine band in the chromatogram of standard solution A
2. A quenching band at Rf of about 0.02
3. Three quenching bands of similar intensity equally spaced located between
4. Under white light, the derivatized chromatogram of the sample solution exhibits main bands similar in position and color to the main bands in the chromatogram of Standard solution C
5. These bands include a dark green band of the same color and Rf as the piperine band in Standard solution A (RF of about 0.15)
6. A weak violet band at Rf of about 0.47 below the position of the band due to borneol in Standard solution B
7. A greenish band in the lower part of the chromatogram at Rf of about 0.07

From Plant Screening to Quantification
Bitter Acids in Hops

The amount of bitter acids in hops is a very important parameter for beer production. Different types of hops contain different quantities of α- and ß-acids which are responsible for the bitterness of the beer. In general, hops are divided into aromatic hops (<10% α-acids) and bitter hops (>10% α-acids).

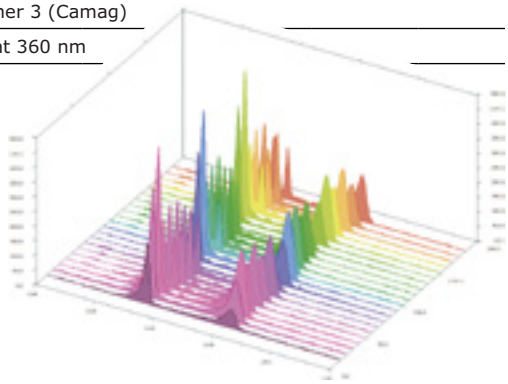
In this study, a total of 12 samples were analyzed: four aromatic hops, four bitter hops and four hops of the same variety, but from different regions. The sample extracts were applied on HPTLC silica gel 60 F_{254} MS-grade plates, and developed and separated with a gradient using the Automated Multiple Development (AMD 2) System. Fluorescence was measured at 360/>400 nm.

Application Data

Plate	HPTLC RP-18 F_{254}s MS-grade, 20x10 cm
Standard	1 mg/mL of the International Calibration Extract 3 (contains 44.64% alpha acid, 24.28% beta acid and 31.08% other ingredients)
Sample preparation	Crumbled the hop-pellets (5 g), added 10.0 mL MeOH, 50.0 mL diethyl ether and 20 mL 0.1 molar hydrochloric acid solution. The solution stirred for 40 min, 2 mL of the upper ether phase removed, the residue filled in a 20.0 mL volumetric flask and filled up with MeOH. The extract filtered with a 0.45 µm syringe filter.
Sample application	ATS 4 automatic TLC sampler (Camag), 6 mm bandwise
Application volume	0.3 – 1.6 µL
Mobile phase	Ethyl acetate/Methanol/n-Heptane as a gradient, developed with the AMD 2 automated multiple development (Camag)

Steps	Ethyl acetate	Methanol	n-Heptane	Migration Distance	Drying Time
1	50.0 Vol%	50.0 Vol%	00 Vol%	12.0 mm	2.0 min
2	40.0 Vol%	40.0 Vol%	20 Vol%	18.0 mm	2.0 min
3	35.0 Vol%	35.0 Vol%	30 Vol%	24.0 mm	2.0 min
4	30.0 Vol%	30.0 Vol%	40 Vol%	30.0 mm	2.0 min
5	25.0 Vol%	25.0 Vol%	50 Vol%	36.0 mm	2.0 min
6	20.0 Vol%	20.0 Vol%	60 Vol%	42.0 mm	2.0 min
7	15.0 Vol%	15.0 Vol%	70 Vol%	48.0 mm	2.0 min
8	10.0 Vol%	10.0 Vol%	80 Vol%	54.0 mm	2.0 min
9	5.0 Vol%	5.0 Vol%	90 Vol%	60.0 mm	2.0 min

Migration distance	5 cm
Migration time	55 min (complete AMD method)
Documentation equipment	Reprostar 3 (Camag)
Wavelength	UV-light at 366 nm
Scan equipment	TLC scanner 3 (Camag)
Wavelength	UV-light at 360 nm



Ordering information

Description	Mfr. No.
HPTLC silica gel 60 F_{254} MS-grade, 20x10 cm	**1.00934**
n-Heptane for liquid chromatography LiChrosolv®	**1.04390**
Ethyl acetate for liquid chromatography LiChrosolv®	**1.00868**
Methanol for liquid chromatography LiChrosolv®	**1.06018**
Millex®-FH filter, 0.45 µm hydrophobic PTFE, 25 mm, non-sterile	**SLFH025NS**
Diethyl ether for spectroscopy Uvasol®	**1.00930**

No.	Hops.	Content [%] of α-acids	Content [%] of ß-acids
	Aromatic Hops		
1	**Mittelfrüh Hallertau**	2.7	3.0
2	**Spalt Spalter**	3.8	5.4
3	**Saazer**	3.2	2.8
4	**Tettnanger**	3.1	3.6
	Bitter Hops		
5	**Apollo**	13.5	5.8
6	**Green Bullet**	9.1	6.0
7	**Hallertau Herkules**	4.0	3.3
8	**Topaz**	16.2	7.2
	Regional Hops		
9	**Cascade NZ**	4.0	3.9
10	**Cascade USA**	8.1	8.0
11	**Cascade Hallertau D**	6.5	6.1
12	**Cascade Lemondrop USA**	4.1	4.2

TLC Plates to Fit Your Needs

As the leading supplier of thin-layer chromatography consumables, we offer an extensive portfolio of plates, reagents and accessories for TLC, preparative TLC, and high performance TLC (HPTLC). In addition, we also offer special MS-grade TLC and HPTLC plates for the perfect combination with mass spectrometry. Each of our high quality products is setting new standards in quality, performance and utility.

Pick your plate

Glass, aluminum or plastic? You have the choice with our classical silica TLC plates. Each is available in a broad range of sizes from 20 x 20 cm down to 2.5 x 7.5 cm. They offer a layer thickness of 250 µm for glass plates and 200 µm for aluminum or plastic, with a mean particle size of 10 - 12 µm. Special plates with a thinner or thicker layer are available, ideal for TLC-MS for example.

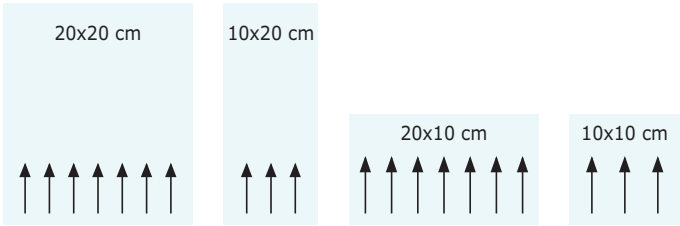
Plate Backing or Support

Classical silica TLC plates are available with glass, aluminum or plastic backings.
The flexible aluminum or plastic sheets can be easily cut with scissors to suit individual separation requirements.

Support/Backing	Advantages	Disadvantages
Glass	Rigid	Fragile
	Transparent	Cannot be easily cut into desired size
	Economical (reusable)	Heavy – high transport costs
	High chemical resistance	Thick (>1.0 mm) – about 5x more shelf space than aluminum or plastic-backed plates
	Most commonly used support	
	Good heat stability for charring	Backing highly susceptible to breakage (potential safety issue)
Aluminum Foil	Easy to handle/safe – resistant to breakage	Backing is not reusable
	Can be easily cut to desired dimensions with scissors	Not as chemically resistant as glass to reagents such as mineral acids and concentrated ammonia
	Thin (~0.15 mm) – minimal storage space	
	Lightweight – lower shipping costs	
	Solvent resistance	
	Strong adsorbent layer adherence – good for use with eluents containing high concentrations of water	
	Good heat stability	
	Can be stored in lab notebook	
Plastic (Polyester – PET)	Easy to handle/safe – resistant to breakage	Backing is not reusable
	Can be easily cut to desired dimensions with scissors	Lower heat stability – charring must be done at lower temperatures than with glass
	Thin (~0.2 mm) – minimal storage space	
	Lightweight – lower shipping costs	Flexible – adsorbent layer may be more susceptible to cracking
	Solvent resistance	
	Can be stored in lab notebook	

Format and Plate Dimensions

TLC and HPTLC plates are available in several different dimensions. The plates dimension (size) is given in cm (e.g., 20x20 cm). Here the first number indicates the plate width an the second the plate height. The migration direction is indicated below:



Glass plates	Aluminum sheets	Plastic sheets
20 × 20	20 × 20	20 × 20
10 × 20 (TLC)	5 × 20	500 × 20
20 × 10 (HPTLC)	5 × 7.5	
5 × 20	500 × 20	
5 × 10		
2.5 × 7.5		

Multiformat Plates

Multiformat glass plates are pre-scored so that they can be easily snapped by hand into smaller sizes. The plates utilize the same proven silica gel coating as the corresponding non-scored TLC or HPTLC plate, delivering chromatograms of equally high quality.

The number of possible plates depends on the scoring. For example, for a 20 × 20 cm plate scored in sections of 5 × 10, up to seven different formats are possible:

- 5 cm × 10 cm
- 5 cm × 20 cm
- 10 cm × 10 cm
- 10 cm × 15 cm
- 10 cm × 20 cm
- 15 cm × 20 cm
- 20 cm × 20 cm

Features and Benefits

- Simply snap to desired size
- Same high quality as classical non-scored TLC and HPTLC plates
- Up to 7 formats in one plate

How to use Multiformat TLC and HPTLC Plates

Note: To prevent the glass backing from breaking in an uncontrolled and irregular manner, avoid putting plates directly on hot metal plates, drying cabinets or plate heaters after development and/or staining. When heat drying is necessary, please use distance holders of low thermal conductivity between the glass and the hot metal plate, i.e. glass rods or similar.

Adsorbent / Layers

Our glass, aluminum foil and plastic PET (polyester) TLC and HPTLC plates are available coated with a variety of adsorbents and are available with and without fluorescent indicator.

- Silica gel (unmodified, modified/bonded, chiral and high purity) is the most common TLC sorbent.
- Aluminum oxide which exhibits similar selectivity, although slightly different, to silica is the second most common TLC sorbent.
- Cellulose – available as either microcrystalline or fibrous cellulose. Spots are generally more compact when separated on layers of microcrystalline cellulose than when separated on layers of fibrous cellulose.
- Kieselguhr is a natural diatomaceous earth that can be used for the separation of polar or moderately polar compounds.

Layer Thickness

The layer thickness of our glass TLC plates is 250 µm, and 200 µm for aluminum or plastic, with a mean particle size of 10–12 µm.

For HPTLC, we use an optimized silica 60 sorbent with a significantly smaller particle size: just 5–6 µm compared to 10–12 µm used for classical TLC. This enables a higher packing density and hence a smoother surface. Band diffusion is also reduced, producing very compact sample bands or spots. These features and the thinner layer (200 µm or 100 µm) ultimately leads to highly increased sensitivity and faster analysis.

Binder

Polymeric (organic) binder:

Our unique binder technology ensures a uniform and hard surface of the TLC plate that will not crack or blister. Traditional silica plates contain a polymeric (organic) binder of high molecular weight acrylic acid polymers for the most rugged plates, making sample handling and application easier. They also permit the use of higher water content in the developing solvent. They are generally recommended for all TLC applications and in many applications outstanding suitability with no negative influence on the chromatographic result has been proven.

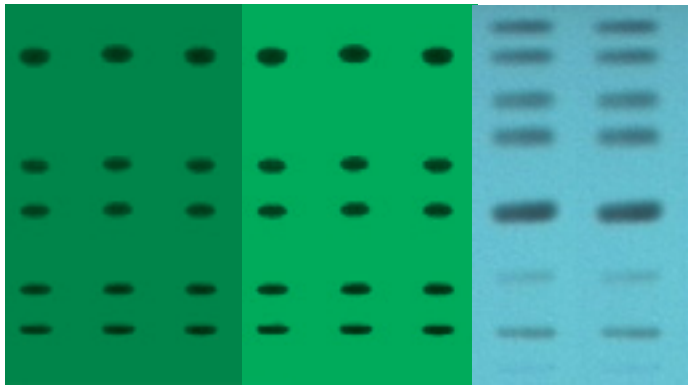
Gypsum:

Gypsum as a binder is recommended for TLC users in QA/QC labs following older Ph. Eur. monograph methods, which require TLC plates with gypsum binder, and who do not wish to switch to classical TLC plates with organic binders. Our TLC silica gel 60 G plates are best suited for this approach.

Binder in cellulose plates: The binder we use for our cellulose plates is Carboxymethylcellulose.

Indicators

We also provide two kinds of inorganic fluorescent indicators for UV detection of colorless substances: the green fluorescing F_{254} or the blue fluorescing, acid-stable $F_{254}s$, both of which fluoresce in UV light at an excitation wavelength of 254 nm. Samples which absorb shortwave UV at 254 nm are detected due to fluorescence quenching. For superior identification of separated substances, our exceptional high-fluorescent LuxPlates® contain a higher amount of fluorescent indicator.



F_{254} LuxPlate® $F_{254}s$

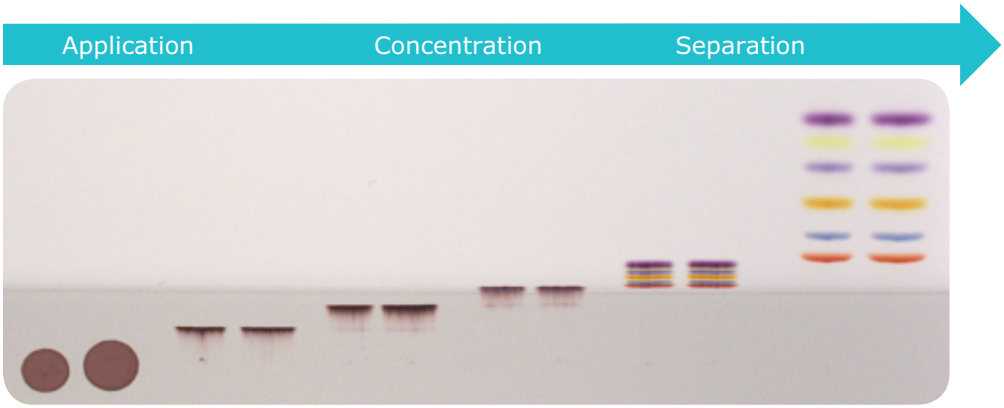
TLC and HPTLC Plates with Concentrating Zone

Quick and Easy Application of Large Sample Volumes

Our concentrating zone plates are based on the different properties of two silica adsorbents: an inert, large-pore concentrating adsorbent where the samples are applied; and a selective separation layer. Independent of the shape, size or position of the spots, the sample always concentrates within seconds as a narrow band at the interface of the two adsorbents. In addition, the concentrating zone can serve as a clean-up step for analytes in complex matrices, such as oils and cosmetics. Suitable for TLC, HPTLC and PLC, these plates allow easy application of large volumes of diluted samples. The concentrating zone is 2.5 cm for our analytical TLC and HPTLC plates, and 4 cm in length for our PLC plates.

Features and Benefits

- Quick and easy sample application
- Highly facilitated sample loading
- Better resolution due to focused bands
- Includes purification and concentration steps



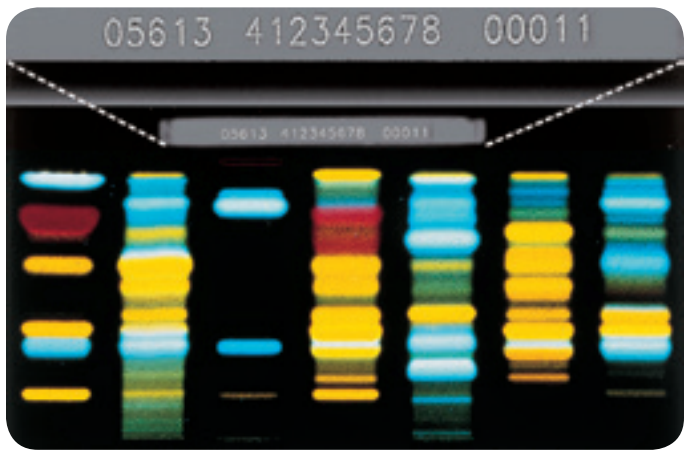
GLP-Plates

With Individual Laser Coding for Secure Documentation

Based on the proven silica gel 60, manufactured by Merck KGaA, Darmstadt germany, our GLP plates deliver the same unsurpassed separation performance as the corresponding TLC or HPTLC plates. The only difference is that each of our laser-coded GLP plates is marked with an item, batch, and individual plate number. This allows you to easily record and archive every plate you use. Our GLP plates are available as TLC or HPTLC grade in various formats, with or without the fluorescence indicator F_{254}, which is stimulated to green emission at 254 nm.

Features and Benefits

- Convenient back tracing of article, batch, and individual plate number
- Easy documentation and archiving of every plate
- Same reliable performance as TLC and HPTLC plates manufactured by Merck KGaA, Darmstadt, Germany



Ordering Information

Classical Silica Plates for TLC

Unmodified silica is the most widely used sorbent in TLC. There's a good reason for this: when combined with a suitable mobile phase, it allows you to analyze almost any substance. The smooth and extremely dense plate coating ensures narrow bands and maximum separation efficiency with lowest background noise. Our silica plates offer all these advantages and more. They utilize the well-established MilliporeSigma silica gel 60 together with a unique polymeric binder, which results in a uniform, hard surface that will not crack or blister.

- Highest quality
- Most reliable batch-to-batch consistency
- Unsurpassed robustness

Reliable routine analysis of a broad range of substances

Unmodified silica gel covers nearly 80% of both adsorption and partition TLC applications. It enables separation of a large range of diverse substances, such as alkaloids, anabolics, carbohydrates, fatty acids, glycosides, lipids, mycotoxins, nucleotides, peptides, pesticides, steroids, sulfonamides, surfactants, tetracyclines and many others. This makes it suitable for:

- In-process control in drug synthesis
- Identity and stability testing of drugs
- Quality control of pharmaceuticals, food and environmental samples
- Residue analysis in food and environmental samples

TLC unmodified silica gel 60

Description	Layer Sorbent/Coating Material	Layer Thickness/ µm	Format/cm	Support/ Backing	Pack size/ content	Mrf. No.
TLC Silica gel 60	Silica gel 60	250	20 x 20	glass	25 plates	**1.05721.0001**
TLC Silica gel 60	Silica gel 60	250	10 x 20	glass	50 plates	**1.05626.0001**
TLC Silica gel 60	Silica gel 60	250	5 x 20	glass	100 plates	**1.05724.0001**
TLC Silica gel 60	Silica gel 60	250	2.5 x 7.5	glass	100 plates	**1.15326.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	20 x 20	glass	25 plates	**1.05715.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	10 x 20	glass	50 plates	**1.05729.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	5 x 20	glass	100 plates	**1.05714.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	5 x 20	glass	25 plates	**1.05808.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	5 x 10	glass	200 plates	**1.05719.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	5 x 10	glass	25 plates	**1.05789.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	2.5 x 7.5	glass*3	100 plates	**1.05794.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	2.5 x 7.5	glass*4	100 plates	**1.15327.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	250	2.5 x 7.5	glass	500 plates	**1.15341.0001**
TLC Silica Gel 60 W F_{254}	Silica Gel 60 W F_{254}s*2	250	20 x 20	glass	25 plates	**1.16485.0001**
LuxPlate® silica gel 60 F_{254}	LuxPlate® silica gel 60 F_{254}*1	250	20 x 20	glass	25 plates	**1.05805.0001**
LuxPlate® silica gel 60 F_{254}	LuxPlate® silica gel 60 F_{254}*1	250	10 x 20	glass	50 plates	**1.05804.0001**
LuxPlate® silica gel 60 F_{254}	LuxPlate® silica gel 60 F_{254}*1	250	5 x 10	glass	25 plates	**1.05802.0001**
LuxPlate® silica gel 60 F_{254}	LuxPlate® silica gel 60 F_{254}*1	250	2.5 x 7.5	glass	100 plates	**1.05801.0001**
TLC Silica gel 60	Silica gel 60	200	20 x 20	aluminum	25 sheets	**1.05553.0001**
TLC Silica gel 60	Silica gel 60	200	5 x 10	aluminum	50 sheets	**1.16835.0001**
TLC Silica gel 60 W	Silica gel 60 W*5	200	20 x 20	aluminum	25 sheets	**1.16487.0001**
TLC Silica gel 60 $_{254}$	Silica gel 60 F_{254}*1	200	20 x 20	aluminum	25 sheets	**1.05554.0001**
TLC Silica gel 60 $_{254}$	Silica gel 60 F_{254}*1	200	10 x 20	aluminum	25 sheets	**1.05570.0001**
TLC Silica gel 60 $_{254}$	Silica gel 60 F_{254}*1	200	5 x 20	aluminum	100 sheets	**1.05534.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	5 x 10	aluminum	50 sheets	**1.16834.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	5 x 7.5	aluminum	20 sheets	**1.05549.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	500 x 20	aluminum	1 roll	**1.05562.0001**
TLC Silica Gel 60 W F_{254}	Silica Gel 60 W*5 F_{254}s*2	200	20 x 20	aluminum	25 sheets	**1.16484.0001**
TLC Silica gel 60	Silica gel 60	200	20 x 20	plastic	25 sheets	**1.05748.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	20 x 20	plastic	25 sheets	**1.05735.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	4 x 8	plastic	50 sheets	**1.05750.0001**
TLC Silica gel 60 F_{254}	Silica gel 60 F_{254}*1	200	500 x 20	plastic	1 roll	**1.05749.0001**

*1 F_{254} Fluorescent indicator *2 F_{254}s Fluorescent indicator, acid stable *3 paper box *4 plastic box *5 W: water-resistant

TLC concentrating zone plates

Description	Layer Sorbent/ Coating Material	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
TLC Silica gel 60 concentrating zone 2.5 x 20 cm	Silica gel 60	250	20 x 20	glass	25 plates	**1.11845.0001**
TLC Silica gel 60 concentrating zone 2.5 x 10 cm	Silica gel 60	250	10 x 20	glass	50 plates	**1.11844.0001**
TLC Silica gel 60 concentrating zone 2.5 x 20 cm	Silica gel 60	200	20 x 20	aluminum	25 sheets	**1.05582.0001**
TLC Silica gel 60 F_{254}[*1] concentrating zone 2.5 x 20 cm	Silica gel 60 F_{254}[*1]	250	20 x 20	glass	25 plates	**1.11798.0001**
TLC Silica gel 60 F_{254}[*1]concentrating zone 2.5 x 10 cm	Silica gel 60 F_{254}[*1]	250	10 x 20	glass	50 plates	**1.11846.0001**
TLC Silica gel 60 F_{254}[*1] concentrating zone 2.5 x 20 cm	Silica gel 60 F_{254}[*1]	200	20 x 20	aluminum	25 sheets	**1.05583.0001**

[*1]F_{254} Fluorescent indicator

TLC GLP Plates

Description	Layer Sorbent/Coating Material	Format/cm	Support/Backing	pack size/Content	Mfr. No.
TLC silica gel 60 F_{254} GLP	Silica gel 60 F_{254}[*1]	20 x 20	glass	25 plates	**1.05566.0001**
TLC silica gel 60 F_{254} GLP	Silica gel 60 F_{254}[*1]	10 x 20	glass	25 plates	**1.05702.0001**

[*1]F_{254} Fluorescent indicator

To find out more and place an order

fishersci.com/supelco

TLC Silica Gel 60 G Plates

Fully compliant with international pharmacopoeia

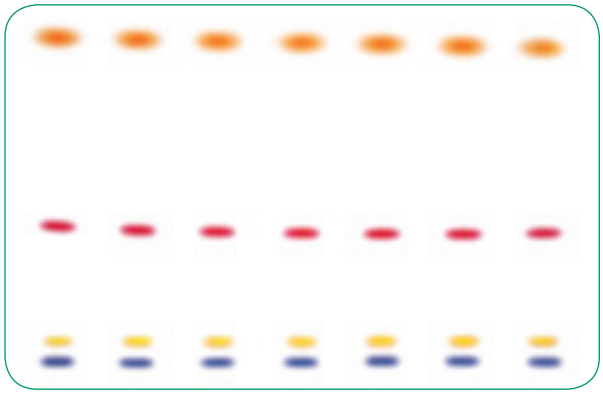
Traditionally, TLC monographs in pharmacopoeia refer to products using silica G, containing gypsum as binder, or silica H with no binder. There are about 200 monograph methods in the European Pharmacopoeia (Ph. Eur.) referring to these plates*.

**** The United States Pharmacopeia (USP) does not distinguish between TLC plates with gypsum or organic binder, thus our standard plates can always be used.***

These new TLC silica gel 60 G plates are recommended for customers in QA/QC labs using older Ph. Eur. monograph methods, which require TLC plates with gypsum binder, and who do not wish to switch to classical TLC plates with organic binders.

Our classical TLC plates fulfill the performance test requirements of Ph. Eur. for G plates with gypsum, even though they use modern organic binders. Today, many customers routinely use these classical TLC plates in place of gypsum plates, and indeed several monographs have been updated to officially confirm this change.**

In additional to the standard Merck KGaA, Darmstadt Germany QC test, the new TLC silica gel 60 G plates are tested using the TLC performance test described by Ph. Eur.



The chromatogram shows four clear separated spots according to Ph. Eur. test conditions and fulfils Ph. Eur. requirements.

Description: Chromatographic separation. Apply an appropriate volume (10 µl for a normal TLC plate and 1 µl to 2 µl for a fine particle size plate) of TLC performance test solution R (Reagent 1116600) to the plate. Develop over a path length of two-thirds of the plate height, using a mixture of 20 volumes of methanol R and 80 volumes of toluene R.

The plate is not satisfactory unless the chromatogram shows four clearly separated spots, the spot of bromocresol green with an Rf value less than 0.15, the spot of methyl orange with an Rf value in the range of 0.1 to 0.25, the spot of methyl red with an Rf value in the range of 0.35 to 0.55 and the spot of Sudan red G with an Rf value in the range of 0.75 to 0.98.

***The following publications (German only) feature monographs of Ph. Eur. on pre-coated TLC plates:*

P. Pachaly: DC-Atlas-Dünnschicht-Chromatographie in der Apotheke, Wissenschaftliche Verlagsgesellschaft Stuttgart 1999, ISBN 3-8047-1623-7. Includes many documented monographs of Ph. Eur. using TLC plates from Merck KGaA, Darmstadt Germany.

Jürgen Wolf: Mikro-DC, PZ-Schriftenreihe: Vorschriften auf Basis des Ph Eur, DAB und DAC. Govi-Verlag, Eschborn 1999, ISBN 3-7741-0736-X. This book features a broad range of monographs of the Ph. Eur. evaluated on Merck KGaA, Darmstadt Germany TLC aluminum sheets Si 60

Parameter	Specification	Typical value
	hRf, values	
Separation	4 clearly separated spots	passed
Bromocresol green	<15	5
Methyl orange	10 - 25	10
Methyl red	35 - 55	38
Sudan red	75 - 98	82

TLC silica gel 60 G, glass-backed

Description	Layer Sorbent/ Coating Material*2	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
TLC Silica gel 60 G F_{254}	TLC Silica gel 60 G F_{254}*1	250	20 x 20	glass	25 plates	**1.00390.0001**
TLC Silica gel 60 G	TLC Silica gel 60 G	250	20 x 20	glass	25 plates	**1.00384.0001**

*1 F_{254} fluorescent indicator

*2 Both new plates have similar separation performance to our classical TLC plates; the only difference is that gypsum is used as binder.

Modified Silica TLC Plates for Enhanced Selectivity

Modified silica TLC plates provide additional selectivity and significantly broaden thin-layer chromatography applications. Hence, they are well suited for demanding TLC separations, and as a pilot technique for HPLC. RP-2, RP-8, and RP-18 plates are based on silica gel 60 modified with aliphatic hydrocarbons. Amino-modified NH_2 silica plates provide weakly basic ion-exchange characteristics with extraordinary selectivity for charged compounds. The CN and Diol modified silica plates are moderately polar and suitable for both normal phase and reversed phase systems.

Free choice of solvent system for special separations and as pilot method for HPLC

When separation challenges cannot be adequately resolved with standard silica, you can count on our modified silica plates to facilitate your application. This system offers a free choice of solvents, so you can be sure that they meet your particular separation requirements.

RP-modified silica plates

RP-2, RP-8 and RP-18 are based on silica gel 60 modified with aliphatic hydrocarbons. The chain length, in combination with the degree of modification, defines the ability to tolerate the water of the solvent system and strongly affects retention. Migration time increases in the order RP-2, RP-8, RP-18 using the same solvent composition. The HPTLC RP-2 sorbent exhibits higher polarity and high affinity for aqueous solutions, tolerating up to 80% water, while the longer carbon chains RP-8 and R-18 can be run with up to 60% water in the solvent system.

NH_2 modified silica plates

The amino modified NH_2 plate provides weakly basic ion exchange characteristics with special selectivity for charged compounds. For many applications, it offers an alternative to PEI cellulose.

Since most substances separated on modified plates are colorless, the majority of our modified silica plates contain the blue fluorescent, acid-stable UV indicator $F_{254}s$. Samples which absorb shortwave UV at 254 nm are detected due to fluorescence quenching.

Your benefits

- Results less dependent on atmospheric humidity
- Allows use of aqueous solvent systems
- RP-modified silica provides ready correlation with HPLC/LPLC
- No catalytic activity for unstable substances (e.g. oxidative degradation)

Modified silica TLC plates provide additional selectivity and significantly broaden TLC applications

RP-modified and NH_2-modified silica plates (TLC)

Description	Layer Sorbent/ Coating Material/ Modification	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
TLC Silica gel 60 RP-2 (silanized)	Silica gel 60 RP-2 (silanized)	250	20 x 20	glass	25 plates	**1.05746.0001**
TLC Silica gel 60 RP-2 F_{254}*1 (silanized)	Silica gel 60 RP-2 F_{254}*1 (silanized)	250	20 x 20	glass	25 plates	**1.05747.0001**
TLC Silica gel 60 RP-8 $F_{254}s$*2	Silica gel 60 RP-8 $F_{254}s$*2	250	20 x 20	glass	25 plates	**1.15388.0001**
TLC Silica gel 60 RP-8 $F_{254}s$*2	Silica gel 60 RP-8 $F_{254}s$*2	250	10 x 20	glass	50 plates	**1.15424.0001**
TLC Silica gel 60 RP-8 $F_{254}s$*2	Silica gel 60 RP-8 $F_{254}s$*2	250	5 x 10	glass	25 plates	**1.15684.0001**
TLC Silica gel 60 RP-8 $F_{254}s$*2	Silica gel 60 RP-8 $F_{254}s$*2	250	20 x 20	glass	25 plates	**1.15389.0001**
TLC Silica gel 60 RP-18 $F_{254}s$*2	Silica gel 60 RP-18 $F_{254}s$*2	250	10 x 20	glass	50 plates	**1.15423.0001**
TLC Silica gel 60 RP-18 $F_{254}s$*2	Silica gel 60 RP-18 $F_{254}s$*2	250	5 x 20	glass	50 plates	**1.15683.0001**
TLC Silica gel 60 RP-18 $F_{254}s$*2	Silica gel 60 RP-18 $F_{254}s$*2	250	5 x 10	glass	25 plates	**1.15685.0001**
TLC Silica gel 60 RP-18 $F_{254}s$*2	Silica gel 60 RP-18 $F_{254}s$*2	200	20 x 20	aluminum	20 sheets	**1.05559.0001**
TLC Silica gel 60 RP-18 $F_{254}s$*2	Silica gel 60 RP-18 $F_{254}s$*2	200	5 x 7.5	aluminum	20 sheets	**1.05560.0001**
TLC Silica gel 60 NH_2 $F_{254}s$*2	Silica gel 60 NH_2 $F_{254}s$*2		20x20	aluminum	20 sheets	**1.05533.0001**

*1F_{254} Fluorescent indicator

*2$F_{254}s$ Fluorescent indicator, acid stable

Aluminum Oxide TLC Plates

Excellent Separations of Basic and Neutral Compounds

Our aluminum oxide (alox) plates for thin-layer chromatography offer distinct advantages with regard to pH. Under aqueous conditions, basic compounds can be best separated on basic alox plates, while neutral alox plates are most suitable for neutral compounds. These plates achieve excellent separations for a wide variety of applications thanks to neutral and basic aluminum oxides with 60 Å pore sizes.

TLC aluminium oxide 60

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
TLC Aluminum oxide 60 F_{254}[*1], basic	Aluminum oxide 60 F_{254}[*1] basic	250	20 x 20	glass	25 plates	**1.05713.0001**
TLC Aluminum oxide 60 F_{254}[*1], basic	Aluminum oxide 60 F_{254}[*1] basic	250	5 x 20	glass	100 plates	**1.05731.0001**
TLC Aluminum oxide 60 F_{254}[*1], neutral	Aluminum oxide 60 F_{254}[*1] neutral	200	20 x 20	aluminum	25 sheets	**1.05550.0001**
TLC Aluminum oxide 60 F_{254}[*1], neutral	Aluminum oxide 60 F_{254}[*1] neutral	200	20 x 20	plastic	25 sheets	**1.05581.0001**

[*1] F_{254} Fluorescent indicator

Kieselguhr and Mixed Layer Plates

For specific applications

Kieselguhr is a natural diatomaceous earth that can be used for the separation of polar or moderately polar compounds. For the mixed layer plates a combination of classical silica gel 60 and kieselguhr is used, providing favorable properties for certain applications such as separation of inorganic ions, herbicides or steroids.

TLC plates kieselguhr, silica gel/kieselguhr

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/cm	Support/ Backing	Pack size/ Content	Mfr. No.
TLC Kieselguhr F_{254}	Kieselguhr F_{254}[*1]	200	20 x 20	glass	25 plates	**1.05738.0001**
TLC Kieselguhr F_{254}	Kieselguhr F_{254}[*1]	200	20 x 20	aluminum	25 sheets	**1.05568.0001**
Silica gel 60/Kieselguhr F_{254}	Silica gel 60 / Kieselguhr F_{254}[*1]	200	20 x 20	aluminum	25 sheets	**1.05567.0001**

[*1] F_{254} Fluorescent indicator

Cellulose TLC and HPTLC Plates

Precise Analysis of Polar Substances

Organic sorbent cellulose is particularly suitable for the separation of hydrophilic substances by partition chromatography; we offer cellulose plates for demanding high-performance separations. Based on microcrystalline cellulose, these TLC plates are ideal for standard separations and our HPTLC plates use high-purity, rod-shaped microcrystalline cellulose, resulting in a highly reduced diffusion of analytes for demanding, high-performance separations.

We also provide special PEI cellulose plates (polyethylenimine-modified cellulose), which act as strong basic anion exchangers. This makes them the best choice for analyzing substances with exchange-active ionic groups, such as amino acids, peptides, nucleotides and nucleosides.

Cellulose plates are available with or without fluorescent indicators. They utilize a special fluorescent pigment that is stimulated to intense blue fluorescent emission by long-wave UV light of 366 nm and by short-wave UV light at 254 nm.

Typical applications of cellulose plates include the analysis of amino acids, carbohydrates, phosphates, nucleic acids and nucleic acid derivatives for:

- Detection of amino acids in clinical laboratories
- 2-dimensional separations such as amino acid “fingerprints”
- Metabolic studies

Cellulose plates (TLC and HPTLC)

Description	Layer Sorbent/ Coating Material	Format/cm	Support/Backing	Pack size/Content	Mfr. No.
TLC Cellulose	Cellulose	20 x 20	glass	25 plates	**1.05716.0001**
TLC Cellulose	Cellulose	10 x 20	glass	50 plates	**1.05730.0001**
TLC Cellulose	Cellulose	10 x 10	glass	100 plates	**1.05632.0001**
TLC Cellulose F	Cellulose F[*1]	20 x 20	glass	25 plates	**1.05718.0001**
TLC Cellulose F	Cellulose F[*1]	10 x 20	glass	50 plates	**1.05728.0001**
TLC Cellulose	Cellulose	20 x 20	aluminum	25 sheets	**1.05552.0001**
TLC Cellulose	Cellulose	500 x 20	aluminum	1 roll	**1.05563.0001**
TLC Cellulose F	Cellulose F[*1]	20 x 20	aluminum	25 sheets	**1.05574.0001**
TLC Cellulose	Cellulose	20 x 20	plastic	25 sheets	**1.05577.0001**
TLC Cellulose F	Cellulose F	20 x 20	plastic	25 sheets	**1.05565.0001**
HPTLC Cellulose	HPTLC Cellulose	20 x 10	glass	50 plates	**1.05786.0001**
HPTLC Cellulose	HPTLC Cellulose	10 x 10	glass	25 plates	**1.05787.0001**
HPTLC Cellulose F	HPTLC Cellulose F[*1]	20 x 10	glass	50 plates	**1.15036.0001**
HPTLC Cellulose F	HPTLC Cellulose F[*1]	10 x 10	glass	25 plates	**1.15035.0001**
HPTLC Cellulose	HPTLC Cellulose	20 x 20	aluminum	25 sheets	**1.16092.0001**
TLC PEI Cellulose F	PEI[*2] Cellulose F[*1]	20 x 20	glass	25 plates	**1.05725.0001**
TLC PEI Cellulose F	PEI[*2] Cellulose F[*1]	20 x 20	plastic	25 sheets	**1.05579.0001**

[*1] Fluorescent indicator wavelength 254/366 nm.

[*2] PEI cellulose plates should be stored cold (0-4 °C) and dry to reduce deterioration. As plates become old they might get yellow colorations and should be discarded.

High Performance Silica Plates (HPTLC)

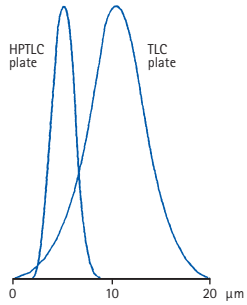
High performance thin-layer chromatography (HPTLC) plates from MilliporeSigma are the perfect choice for quantitative separation using instrumental HPTLC. The optimized, smaller particles enable significantly higher speed, more efficiency and better sensitivity than classical TLC plates. The parallel separation of many samples per plate and an extremely high matrix-tolerance enables a separation time of 20 seconds (or less) per sample with almost no need for sample preparation, which makes HPTLC outstanding in cost-efficiency.

Features and Benefits

- Faster analysis, only 3–20 min for optimum separations
- 5–10 fold higher sensitivity than classical TLC
- Highly reproducible, focused bands for quantitative analysis
- Gold standard for instrumental automation

Smaller Particles for Advanced Separations

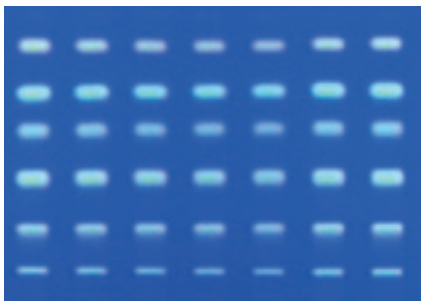
Our HPTLC plates use an optimized silica gel 60 sorbent with a particle size of only 5-6 µm, compared to the 10-12 µm used in classical TLC. This enables a higher packing density and smoother surface. What's more, band diffusion is reduced, yielding especially compact sample zones or spots. The smaller particle size and thinner layer (200 µm or 100 µm) results in significantly higher sensitivity and faster analysis.



Features of HPTLC versus classical TLC	HPTLC	Classical TLC
Mean particle size	5 – 6 µm	10 – 12 µm
Particle size distribution	4 – 8 µm	5 – 20 µm
Layer thickness	200 µm (100 µm)	250 µm
Plate height	12 µm	30 µm
Typical migration distance	3 – 6 cm	10 – 15 cm
Typical separation time	3 – 20 min	20 – 200 min
Number of samples per plate	< 36 (72)	< 10
Sample volume	0.1 – 0.5 µl	1 – 5 µl
Detection limits: absorption	100 – 500 pg	1 – 5 ng
Detection limits: emission (fluorescence)	5 – 10 pg	50 – 100 pg

Comparison of classical TLC plates versus HPTLC plates

Sample	Conditions	TLC	HPTLC
N-alpha-dansyl-L-asparagine	Mobile phase	Ethyl acetate / methanol /propionic acid	Ethyl acetate / methanol /propionic acid
α-Dansyl-L-arginine		(20/10/3)	(20/10/3)
Dansyl-L-cysteic acid	Detection	UV 366 nm	UV 366 nm
N-dansyl-L-serine	Sample volume	4 µl	0.3 µl
Dansyl-glycine	Migration distance	10 cm	5 cm
N-N Dansyl-L-tyrosine	Analysis time	42 min	13 min 45 sec


A classical TLC silica 60 plate


HPTLC silica gel 60 plate

Application Areas

HPTLC plates are ideal for highly demanding quantitative analyses, such as:

- Identity testing in the analysis of herbal medicines
- Highly sophisticated quantitative separations of pharmaceutical drugs using instrumental analysis
- Quality control or purity testing of complex samples in pharmaceutical drugs
- Trace analysis of contaminants in food

Higher Speed and Sensitivity

Classical Silica HPTLC Plates

Our classical silica HPTLC plates are available with glass or aluminum backing in a variety of formats to suit your requirements. Fluorescent indicators are also available: green fluorescent F_{254}, or blue fluorescent acid-stable F_{254}s. Both indicators fluoresce in UV light at an excitation wavelength of 254 nm.

Our classical silica HPTLC plates enable fast, quantitative analyses of complex samples for manual or instrumental use. These plates offer higher speed and sensitivity than conventional TLC plates–making them the best choice for sophisticated separations.

Premium Purity HPTLC Plates

Premium purity HPTLC plates are optimized for high-performance, completely contamination-free separations, such as demanding pharmacopoeia applications. The plates are wrapped in plastic-coated aluminum foil, which prevents deposition of plasticizers that could appear as unknown extra zones when using medium-polar solvent systems.

AMD HPTLC plates

With an extra-thin layer of only 100 µm, AMD HPTLC plates are designed for even more demanding automated multiple development (AMD) applications. The technique combines repeated development of the plate in the same direction with reproducible gradient elution. AMD HPTLC plates provide extremely narrow bands, allowing the complete resolution of up to 40 components over a distance of only 60 mm. The special properties of AMD HPTLC plates are highly beneficial for complex investigations, like the qualitative and quantitative analysis of pesticides.

HPTLC unmodified silica gel 60

Description	Layer Sorbent/Coating Material	Layer Thickness/ µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
HPTLC silica gel 60	HPTLC silica gel 60	200	20 x 10	glass	50 plates	**1.05641.0001**
HPTLC silica gel 60	HPTLC silica gel 60	200	10 x 10	glass	25 plates	**1.05631.0001**
HPTLC silica gel 60	HPTLC silica gel 60	200	10 x 10	glass	100 plates	**1.05633.0001**
HPTLC silica gel 60 F_{254}s	HPTLC silica gel 60 F_{254}s[*2]	200	20 x 10	glass	25 plates	**1.15696.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	20 x 10	glass	50 plates	**1.05642.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	10 x 10	glass	25 plates	**1.05628.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	10 x 10	glass	100 plates	**1.05629.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	5 x 10	glass	25 plates	**1.05616.0001**
HPTLC silica gel 60	HPTLC silica gel 60	200	20 x 20	aluminum	25 sheets	**1.05547.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	20 x 20	aluminum	25 sheets	**1.05548.0001**
HPTLC silica gel 60 F_{254}	HPTLC silica gel 60 F_{254}[*1]	200	5 x 7.5	aluminum	20 sheets	**1.05556.0001**
HPTLC silica gel 60 WR F_{254}s	HPTLC silica gel 60 WR F_{254}s[*2]	200	20 x 10	glass	25 plates	**1.15552.0001**
HPTLC silica gel 60 F_{254} AMD, extra thin	HPTLC silica gel 60 F_{254}[*1], AMD	100	20 x 10	glass	25 plates	**1.11764.0001**
HPTLC silica gel 60 WR F_{254}s AMD, extra thin	HPTLC silica gel 60 WR F_{254}s[*2], AMD	100	20 x 10	glass	25 plates	**1.12363.0001**
HPTLC silica gel 60 F_{254} premium purity	HPTLC silica gel 60 F_{254}[*1] premium purity	200	20 x 10	glass	25 plates	**1.05648.0001**

[*1] F_{254} Fluorescent indicator
[*2] F_{254}s Fluorescent indicator, acid stable
[*5] Plastic box
WR: Water-Resistant

HPTLC plates with concentrating zone

Description	Layer Sorbent / Coating Material	Plate size/ cm	Scored/ cm	Pack size/ Content	number of plates possible	Mfr. No.
HPTLC Silica gel 60 concentrating zone 2.5 x 20 cm	Silica gel 60	250	20 x 10	glass	50 plates	**1.13749.0001**
HPTLC Silica gel 60 concentrating zone 2.5 x 10 cm	Silica gel 60	250	10 x 10	glass	25 plates	**1.13748.0001**
HPTLC Silica gel 60 F_{254} concentrating zone 2.5 x 20 cm	Silica gel 60 F_{254}*1	250	20 x 10	glass	50 plates	**1.13728.0001**
HPTLC Silica gel 60 F_{254} concentrating zone 2.5 x 10 cm	Silica gel 60 F_{254}*1	250	10 x 10	glass	25 plates	**1.13727.0001**
HPTLC Silica gel 60 F_{254} concentrating zone 2.5 x 5 cm	Silica gel 60 F_{254}*1 =	250	5 x 10	glass	25 plates	**1.13187.0001**
HPTLC Silica gel 60 RP-18 F_{254}s concentrating zone 2.5 x 20 cm	Silica gel 60 RP-18 F_{254}s*2	250	20 x 10	glass	25 plates	**1.15498.0001**

*1 F_{254} Fluorescent indicator *2 F_{254}s Fluorescent indicator, acid stable

HPTLC Plates GLP

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/cm	Support/ Backing	Pack size /Content	Mfr. No.
HPTLC silica gel 60 GLP	Silica gel 60	250	20 x 10	glass	25 plates	**1.13326.0001**
HPTLC silica gel 60 F_{254} GLP	Silica gel 60 F_{254}*1	250	20 x10	glass	25 plates	**1.05613.0001**
HPTLC silica gel 60 F_{254} GLP	Silica gel 60 F_{254}*1	250	10 x 10	glass	25 plates	**1.05564.0001**

*1 F_{254} Fluorescent indicator

ProteoChrom™ HPTLC Plates

ProteoChrom™ HPTLC Plates

ProteoChrom™ HPTLC plates are optimized for highly efficient, highly sensitive separations, especially for the analysis of peptides and protein digests, thanks to enhanced separation and staining procedures. For maximum convenience, each ProteoChrom™ package includes an insert sheet with detailed instructions for solvent systems, running conditions and staining solutions.

ProteoChrom™ HPTLC Silica Gel 60 F_{254}s Plates

Based on an extra-thin layer of our high-performance silica gel, ProteoChrom™ HPTLC silica gel 60 F_{254}s plates provide highly efficient separation characteristics for 1-D analysis of peptides and protein digests. Thanks to their special binder composition, these plates are also highly stable in water, thus ideal for use with aqueous solvent systems. Up to 20 peptides can be resolved, and as little as 1-2 ng per band can be visualized.

ProteoChrom™ HPTLC Cellulose Sheets

Alternatively, ProteoChrom™ HPTLC cellulose sheets are based on an extra-thin layer of optimized microcrystalline cellulose. Specially created protocols for development and staining enable straightforward 2-D analysis in only 4 hours.

Features and benefits

- Highly reproducible: optimized separation & staining procedures
- Convenient: easy-to-follow, detailed protocols included
- High detection sensitivity: extra-thin layers of 100 µm
- Highly stable in water: ideal for use with aqueous solvent systems

ProteoChrom™ HPTLC Plates

Description	Layer Sorbent/ Coating Material	Layer Thickness/ µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
ProteoChrom™ HPTLC silica gel 60 F_{254}s	HPTLC silica gel 60 F_{254}s*1	100	20 x 10	glass	25 plates	**1.05650.0001**
ProteoChrom™ HPTLC Cellulose	HPTLC Cellulose	100	10 x 10	aluminum	25 sheets	**1.05651.0001**

*1 F_{254}s fluorescence indicator, acid stable

Each ProteoChrom™ package includes an insert sheet with detailed instructions for solvent systems, running conditions and staining solution, enabling straightforward experiments without time-consuming optimization work.

Modified Silica HPTLC Plates

Reversed-Phase (RP) Modified Silica HPTLC Plates

Overcome Challenging HPTLC Separations

Reversed-phase (RP) modified silica HPTLC plates provide additional selectivity to significantly broaden thin-layer chromatography applications. Hence, they are well suited for demanding HPTLC separations, and as a pilot technique for HPLC. RP-2, RP-8, and RP-18 plates are based on silica gel 60, modified with aliphatic hydrocarbons. The chain length, combined with the degree of modification, defines the plate's ability to tolerate the water of the solvent system, and strongly affects retention. Using the same solvent system, migration time increases in the order: RP-2, RP-8, RP-18.

RP-2 HPTLC sorbents exhibit higher polarity and a high affinity to aqueous solutions, tolerating up to 80% water. In contrast, the longer carbon chains, RP-8 and RP-18, can be run with up to 60% water in the solvent system. The specially developed RP-18W HPTLC plate offers a lower degree of surface modification, hence it can be used even with 100% water in the solvent system.

Reversed-phase-(RP) modified HPTLC silica plates

Description	Layer Sorbent/Coating Material/Modification	Layer Thickness/µm	Format/cm	Support/ Backing	Pack size/ Content	Mfr. No.
HPTLC Silica gel 60 RP-2 $F_{254}s^{*2}$	Silica gel 60 RP-2 $F_{254}s^{*2}$	200	10 x 10	glass	25 plates	**1.13726.0001**
HPTLC Silica gel 60 RP-8 $F_{254}s^{*2}$	Silica gel 60 RP-8 $F_{254}s^{*2}$	200	10 x 10	glass	25 plates	**1.13725.0001**
HPTLC Silica gel 60 RP-18	Silica gel 60 RP-18	200	20 x 10	glass	25 plates	**1.05914.0001**
HPTLC Silica gel 60 RP-18 W New	Silica gel 60 RP-18 W New	200	20 x 10	glass	25 plates	**1.14296.0001**
HPTLC Silica gel 60 RP-18 $F_{254}s^{*2}$	Silica gel 60 RP-18 $F_{254}s^{*2}$	200	20 x 10	glass	25 plates	**1.16225.0001**
HPTLC Silica gel 60 RP-18 $F_{254}s^{*2}$	Silica gel 60 RP-18 $F_{254}s^{*2}$	200	10 x 10	glass	25 plates	**1.13724.0001**
HPTLC Silica gel60 RP-18 W $F_{254}s^{*2}$	Silica gel60 RP-18 W $F_{254}s^{*2}$	200	10 x 10	glass	25 plates	**1.13124.0001**

$^{*1}F_{254}$ Fluorescent indicator $^{*2}F_{254}s$ Fluorescent indicator, acid stable W: wettable with water

CN and Diol-Modified Plates

Normal-Phase and Reversed-Phase Separations

CN and Diol-modified silica plates are moderately polar, and suitable for both normal-phase and reversed-phase systems. The CN-modified plate is based on a silica gel 60 modified with a cyanopropyl group, while the Diol-modified plate utilizes a silica surface modified by a vicinal diol alkyl ether. The dual characteristic of the CN plate enables unique two-dimensional separations by using the normal-phase mechanism in the first direction, followed by the reversed-phase mechanism in the second direction.

NH_2-Modified Plates

Excellent Separation of Charged Compounds

Amino-modified NH_2 plates provide weakly basic ion-exchange characteristics with extraordinary selectivity for charged compounds. These unique features enable the separation of compounds such as nucleotides, purines, pyrimidines, phenols and sulfonic acids using simple eluent mixtures. For many applications, NH_2-modified silica plates offer an alternative to PEI cellulose. In addition, they allow reagent-free detection of certain compounds (e.g. carbohydrates) by thermochemical fluorescence activation.

CN-, Diol- and NH_2- modified HPTLC silica plates

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/cm	Support/ Backing	Pack size/ Content	Mfr. No.
HPTLC silica gel 60 CN $F_{254}s$	HPTLC silica gel 60 CN $F_{254}s^{*1}$	200	10 x 10	glass	25 plates	**1.16464.0001**
HPTLC silica gel 60 Diol $F_{254}s$	HPTLC silica gel 60 Diol $F_{254}s^{*1}$	200	10 x 10	glass	25 plates	**1.12668.0001**
HPTLC silica gel 60 Diol $F_{254}s$	HPTLC silica gel 60 Diol $F_{254}s^{*1}$	200	20 x 10	glass	25 plates	**1.05636.0001**
HPTLC silica gel 60 NH_2	HPTLC silica gel 60 NH_2	200	20 x 10	glass	25 plates	**1.12572.0001**
HPTLC silica gel 60 NH_2 $F_{254}s$	HPTLC silica gel 60 NH_2 $F_{254}s^{*1}$	200	20 x 10	glass	25 plates	**1.13192.0001**
HPTLC silica gel 60 NH_2 $F_{254}s$	HPTLC silica gel 60 NH2 $F_{254}s^{*1}$	200	10 x 10	glass	26 plates	**1.15647.0001**

^{*1} Fluorescent indicator, acid stable

LiChrospher® HPTLC plates

Optimized for High-Throughput Separations

MilliporeSigma's unique LiChrospher® HPTLC plates are the first thin-layer chromatography plates based on spherical silica particles. Compared to standard HPTLC plates, they offer maximum performance and speed, thus enabling high-throughput analyses of complex samples.

Improved Detection Limits

LiChrospher® HPTLC plates are based on spherical silica 60 with a particle size of 7 µm, and a narrow particle-size distribution similar to that used in HPLC. While LiChrospher® plates possess a broad selectivity very similar to that of the corresponding HPTLC plates, the plate height, separation numbers and velocity constants have been further improved. This results in shorter analysis times and improved detection limits.

Features and Benefits

- 20% reduced running times in comparison to HPTLC
- Highly compact spots or zones for higher detection sensitivity
- Low detection limits

Application Areas

- LiChrospher® HPTLC plates are especially suitable for separations of highly complex, low concentration samples, such as:
  - Trace analysis of pesticide mixtures
  - Assay of pharmaceutical compounds

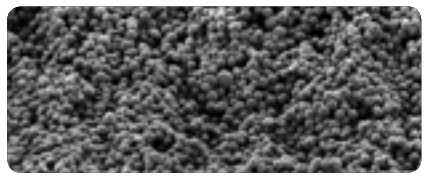
LiChrospher® Si 60 F_{254}s HPTLC Plates versus conventional Si 60 F_{254} HPTLC Plates

Compounds	Visual		Spectrophotochemical	
	HPTLC Silica gel 60 F_{254} / ng	LiChrospher® Si 60 F_{254}s / ng	HPTLC Silica gel 60 F_{254} / ng	LiChrospher® Si 60 F_{254}s / ng
Ascorbic acid	100	100	100	25
Cortisone	50	25	25	10
Atrazine	50	25	10	5
Prometryn	25	10	10	5
Theophylline	50	25	25	10
o-Aminophenol	50	25	25	5
m-Aminophenol	10	5	10	5
p-Aminophenol	100	50	50	25

Scanning electron images of the cross-sections of:

A. Classical silica TLC plate

B. High-performance silica HPTLC plate



C. LiChrospher® silica HPTLC plate

LiChrospher® HPTLC unmodified silica gel 60

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
LiChrospher® HPTLC silica gel 60 F_{254}s	LiChrospher® silica gel 60 F_{254}s[*1]	200	20 x 10	glass	25 plates	**1.15445.0001**
LiChrospher® HPTLC silica gel 60 F_{254}s	LiChrospher® silica gel 60 F_{254}s[*1]	200	20 x 20	aluminum	25 sheets	**1.05586.0001**
LiChrospher® HPTLC silica gel 60 WR F_{254}s AMD extra thin	LiChrospher® silica gel 60 WR F_{254}s[*1]AMD	100	20 x 10	glass	25 plates	**1.05647.0001**

[*1] F_{254}s Fluorescent indicator, acid stable WR: water-resistant

LiChrospher® HPTLC RP-modified silica gel 60

Description	Layer Sorbent/Coating Material	Layer Thickness/µm	Format/ cm	Support/ Backing	Pack size/ Content	Mfr. No.
LiChrospher® HPTLC Silica gel 60 RP-18 WF_{254}s	LiChrospher®Silica gel 60 RP-18 WF_{254}s[*1]	200	20 x 10	glass	25 plates	**1.05646.0001**

[*1] F_{254}s Fluorescent indicator, acid stable WR: wettable with water

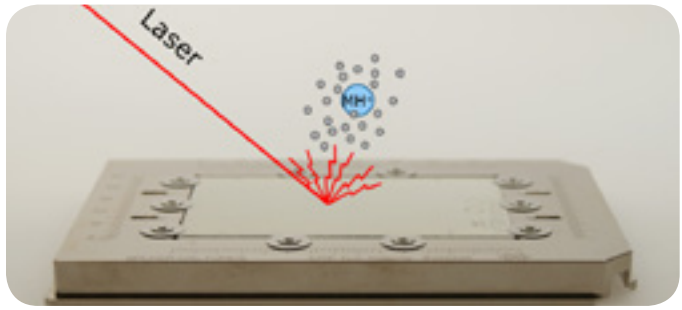
TLC and HPTLC MS-Grade Plates

Exceptional Sensitivity with Extremely Low Background Signal

Coupling TLC plates with mass spectrometry (TLC-MS) is a field of high interest in planar chromatography. One particular advantage of TLC-MS is the flexibility it offers in the choice of mobile phases for separations. In comparison, HPLC-MS coupling does not allow the use of certain mobile phases, such as inorganic buffers.

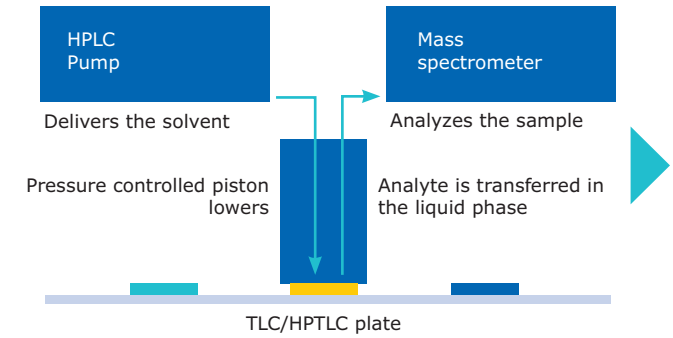
TLC-MS Coupling Techniques

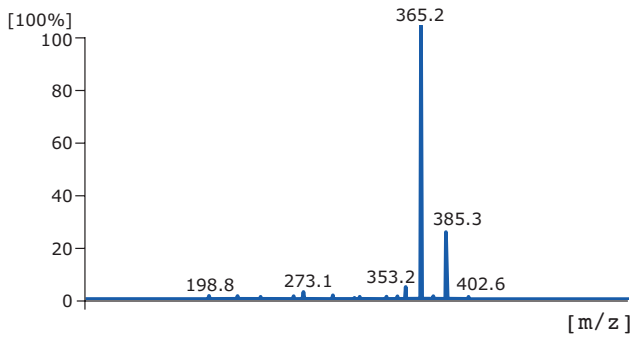
The techniques for coupling TLC with mass spectrometry can be divided into elution-based, or desorption-based. Both approaches are offline, and are performed after the separation is completed and the plate dried. Sample transfer to the mass spectrometer is fast and typically takes less than one minute.

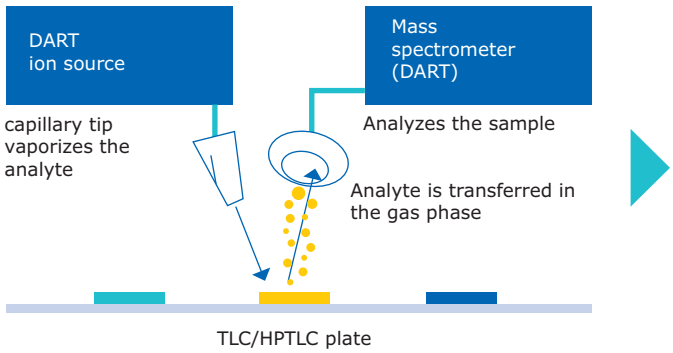


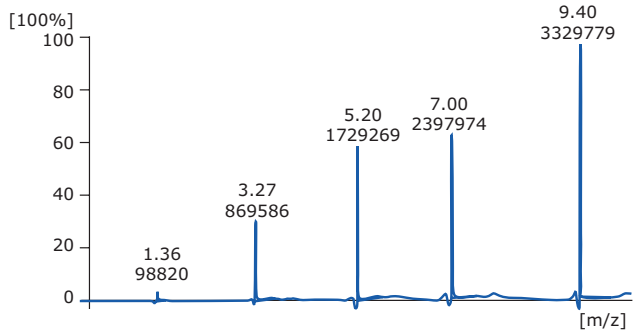
Elution-based TLC-MS

The analyte on the silica plate is dissolved in a solvent and transferred to the mass spectrometer in the liquid phase.









Desorption-based TLC-MS

The analyte is vaporized from the silica, and transferred to the mass spectrometer in the gas phase. Vaporization techniques include gas beam, ion bombardment, and MALDI (matrix-assisted laser desorption/ionization).

TLC-MALDI-MS

Matrix-assisted laser desorption/ionization (MALDI) is an ionization technique that uses a laser energy absorbing matrix to create ions from large molecules with minimal fragmentation. It has been applied to the analysis of biomolecules and large organic molecules and other macromolecules which tend to be fragile and fragment when ionized using more conventional ionization methods.

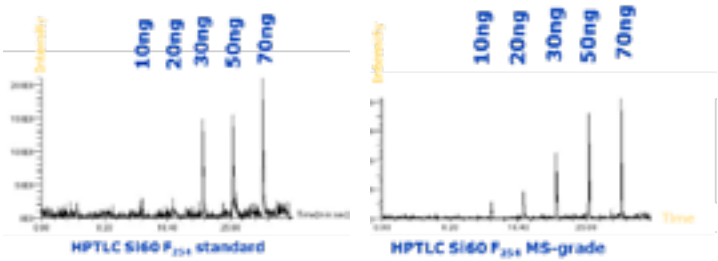
DART

DART (Direct Analysis in Real Time) is an atmospheric pressure ion source that instantaneously ionizes gases, liquids and solids in open air under ambient conditions.

MS-Grade Plates from a Leader in TLC

MilliporeSigma introduced the first pre-coated plates on the market. We were also the first to offer glass plates for coupling planar chromatography with mass spectrometry. Our most recent developments in this field are our MS-grade TLC and HPTLC plates. The separation performance of these products is equivalent to our standard TLC and HPTLC plates. The only difference is that the new plates are much cleaner, and allow trace analysis in the nanogram range. Furthermore, our MS-grade plates offer exceptional sensitivity with extremely low background, hence a better signal-to-noise ratio, as verified by the experiments below.

High sensitivity - Guaranteed constant high quality



TLC-MS plates

Description	Layer Sorbent/ Coating Material	Sorbent modification	Layer Thickness/ µm	Format/ cm	Support Material/ Backing	Pack size/ Content	Mfr. No.
TLC silica gel 60 F_{254} MS-grade, 25 glass plates 20 x 20 cm	Silica gel 60 F_{254} [*1]	no	200	20x20	glass	25 plates	**1.00933.0001**
TLC silica gel 60 F_{254} MS-grade, 20 Aluminum sheets [*3] 5x7.5	Silica gel 60 F_{254} [*1]	no	100	5x7.5	aluminum	20 sheets	**1.51022.0001**
TLC silica gel 60 RP-18 F_{254}s MS-grade, 20 Aluminum sheets [*3] 5x7.5	Silica gel 60 F_{254}s [*2] modified	RP-18 modified (aliphatic hydrocarbons)	100	5x7.5	aluminum	20 plates	**1.51015.0001**

[*1] F_{254} Fluorescent indicator [*2] F_{254}s Fluoresent indicator, acid resistant [*3] suitable for TLC-MALDI-MS

HPTLC-MS plates

Description	Layer Sorbent/ Coating Material	Sorbent modification	Layer Thickness /µm	Format/ cm	Support Material/ Backing	Pack size/ Content	Mfr. No.
HPTLC silica gel 60 F_{254} MS-grade, 25 glass plates 20 x 10 cm	Silica gel 60 F_{254} [*1]	no	100	20x10	glass	20 plates	**1.00934.0001**
HPTLC silica gel 60 F_{254} MS-grade for MALDI [*3], 20 aluminum foils 5 x 7.5 cm	Silica gel 60 F_{254} [*1]	no	100	5x7.5	aluminum	20 sheets	**1.51160.0001**
HPTLC silica gel 60 RP18 F_{254}s MS-grade, 25 glass plates 20 x 10 cm	Silica gel 60 F_{254}s [*2] modified	RP-18 modified (aliphatic hydrocarbons)	100	20x10	glass	20 plates	**1.51161.0001**

[*1] F_{254} Fluorescent indicator [*2] F_{254}s Fluorescent indicator, acid resistant [*3] suitable for TLC-MALDI-MS

PLC Plates for Separations from Milligrams to Grams

Our preparative layer (PLC) plates allow separation and purification of samples varying in quantity—from milligrams to grams. Samples are typically applied as a band across the width of the glass plate and analyzed by UV detection. To isolate the substance by extraction, it is simply scraped from the PLC plate. We offer PLC plates with both unmodified and modified layers, in a variety of thicknesses (0.5 mm to 2 mm), and with or without fluorescent indicators.

Features and Benefits

- Separation and purification from milligram to gram quantities
- Thicker layers for high sample loading
- Same proven silica-binder technology as our analytical TLC plates

PLC silica gel 60

Description	Layer Sorbent /Coating Material	Layer Thickness/mm	Format/cm	Support/ Backing	Pack size/ Content	Mfr. No.
PLC Silica gel 60, 0.5 mm	Silica gel 60	0.5	20 x 20	glass	20 plates	**1.13894.0001**
PLC silica gel 60, 2mm	Silica gel 60	2	20 x 20	glass	12 plates	**1.05745.0001**
PLC Silica gel 60 F_{254}, 0.5 mm	Silica gel 60 F_{254} *1	0.5	20 x 20	glass	20 plates	**1.05744.0001**
PLC Silica gel 60 F_{254}, 1 mm	Silica gel 60 F_{254} *1	1	20 x 20	glass	15 plates	**1.13895.0001**
PLC Silica gel 60 F_{254}, 2 mm	Silica gel 60 F_{254} *1	2	20 x 20	glass	12 plates	**1.05717.0001**
PLC Silica gel 60 $F_{254+366}$, 2 mm	Silica gel 60F $F_{254+366}$ *2	2	20 x 20	glass	12 plates	**1.05637.0001**
PLC Silica gel 60 RP-18 F_{254}s, 1 mm	Silica RP-18 F_{254}s*3	1	20 x 20	glass	15 plates	**1.05434.0001**

*1 F_{254} Fluorescent indicator *2 $F_{254+366}$ Fluorescent indicator *2 F_{254}s Fluorescent indicator, acid stable

PLC aluminum oxide 60 and 150

Description	Layer Sorbent /Coating Material	Layer Thickness/mm	Format/cm	Support/ Backing	Pack size/ Content	Mfr. No.
PLC Aluminum oxide 60 F_{254}, 1.5 mm	Aluminum oxide 60 F_{254} *1	1.5	20 x 20	glass	12 plates	**1.05788.0001**
PLC Aluminum oxide 60 F_{254}, 1.5 mm	Aluminum oxide 150 F_{254} *1	1.5	20 x 20	glass	12 plates	**1.05726.0001**

*1 Fluorescent indicator

PLC concentrating zone plates, glass-backed

Description	Layer Sorbent/ Coating Material	Layer Thickness/mm	Format /cm	Support/ Backing	Pack size/ Content	Mfr. No.
PLC Silical gel 60 F_{254} 0.5 mm with concentration zone 4 X20 cm	Silica gel 60 F_{254} *1, 0.5 mm with concentrating zone 4 x 20 cm	0.5	20 x 20	glass	20 plates	**1.13794.0001**
PLC Silical gel 60 F_{254} 1 mm with concentration zone 4 X20 cm	Silica gel 60 F_{254} *1, 1 mm with concentrating zone 4 x 20 cm	1	20 x 20	glass	15 plates	**1.13792.0001**
PLC Silical gel 60 F_{254} 2 mm with concentration zone 4 X20 cm	Silica gel 60 F_{254} *1, 2 mm with concentrating zone 4 x 20 cm	2	20 x 20	glass	12 plates	**1.13793.0001**

*1 F_{254} Fluorescent indicator

Multiformat Plates

Description	Layer Sorbent / Coating Material	Plate size/ cm	Scored/ cm	Pack size/ Content	number of plates possible	Mfr. No.
TLC Silica gel 60 F_{254} Multiformat pre-scored 5 x 10 cm	Multiformat silica gel 60 F_{254} *1	20 x 20	5 x 10	25 plates	200	**1.05620.0001**
TLC Silica gel 60 F_{254} Multiformat pre-scored 5 x 20 cm	Multiformat silica gel 60 F_{254} *1	20 x 20	5 x 20	20 plates	80	**1.05608.0001**
HPTLC Silica gel 60 Multiformat pre-scored 5 x 5 cm	Multiformat silica gel 60 F_{254} *1	10 x 10	5 x 5	25 plates	100	**1.05635.0001**
HPTLC Silica gel 60 Multiformat pre-scored 5 x 5 cm	Multiformat silica gel 60	10 x 10	5 x 5	100 plates	400	**1.05644.0001**

*1 F_{254} Fluorescent indicator

Layer thickness: TLC plates: 250 µm; HPTLC plates 200 µm

TLC Adsorbents: Broad Range for All Requirements

MilliporeSigma offers a comprehensive portfolio of sorbents for the preparation of TLC plates. All sorbents are standardized to ensure reliable results in thin-layer chromatography.

Features and Benefits

- Broad portfolio to suit different TLC, HPTLC and PLC applications
- Standardized quality for reliable results
- Depending on the TLC plate you need to prepare, you can choose from a variety of sorbent materials, grades and particle sizes, which are available with or without binders and fluorescent indicators.

Loose sorbents for TLC plates (particle size 5-40 µm)

Description	Sorbent / Coating Material*4	Comment	Package Material	Pack size/ Content	Mfr. No.
Silica gel 60 G	Silica gel 60 G	Classical TLC	Plastic	1 kg	**1.07731.1000**
Silica gel 60 G	Silica gel 60 G	Classical TLC	Tin	5 kg	**1.07731.5000**
Silica gel 60 G	Silica gel 60 G	Classical TLC	Tin	25 kg	**1.07731.9025**
Silica gel 60 G F_{254}	Silica gel 60 G F_{254}*1	Classical TLC, with Gypsum	Plastic	1 kg	**1.07730.1000**
Silica gel 60 G F_{254}	Silica gel 60 G F_{254}*1	Classical TLC, with Gypsum	Tin	5 kg	**1.07730.5000**
Silica gel 60 G F_{254}	Silica gel 60 G F_{254}*1	Classical TLC, with Gypsum	Tin	25 kg	**1.07730.9025**
Silica gel 60 G F_{254}	Silica gel 60 G F_{254}*1	TLC	Plastic	1 kg	**1.11678.1000**
Silica gel 60 H	Silica gel 60 H*3	TLC	Plastic	1 kg	**1.07736.1000**
Silica gel 60 H	Silica gel 60 H*3	TLC	Tin	2.5 kg	**1.07736.2500**
Silica gel 60 H	Silica gel 60 H*3	TLC	Tin	25 kg	**1.07736.9025**
Silica gel 60 H	Silica gel 60 H*3	TLC	Plastic	1 kg	**1.11695.1000**
Silica gel 60 H F_{254}	Silica gel 60 H*3 F_{254}*1	TLC	Plastic	1 kg	**1.07739.1000**
Silica gel 60 H F_{254}	Silica gel 60 H*3 F_{254}*1	TLC	Tin	2.5 kg	**1.07739.2500**
Silica gel 60 H F_{254}	Silica gel 60 H*3 F_{254}*1	TLC	Tin	25 kg	**1.07739.9025**
Silica gel 60 H $F_{254+366}$	Silica gel 60 H*3 $F_{254+366}$*2	TLC	Plastic	1 kg	**1.07741.1000**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Plastic	1 kg	**1.07747.1000**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Tin	2.5 kg	**1.07747.2500**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Tin	25 kg	**1.07747.9025**
Silica gel 60 P $F_{254+366}$	Silica gel 60 P $F_{254+366}$*2	PLC, for preparative work	Plastic	1 kg	**1.07748.1000**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Tin	2.5 kg	**1.07748.2500**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Plastic	1 kg	**1.07749.1000**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Tin	2.5 kg	**1.07749.2500**
Silica gel 60 P F_{254}	Silica gel 60 P F_{254}*1	PLC, for preparative work	Tin	25 kg	**1.07749.9025**

*1 F_{254} Fluorescent indicator *2 $F_{254+366}$ Fluorescent indicator *3 without foreign binder *4 Mean particle size 15 µm

Aluminum oxides for TLC and PLC (particle size 5-40 µm)

Description	Material	Comment	pH of 10% aqueous suspension	Package Material	Pack size/ Content	Mfr. No.
Aluminum oxide 60 G, neutral (type E)	Aluminum oxide 60 G, neutral	TLC, with Gypsum	7.5	Plastic	2.5 kg	**1.01090.2500**
Aluminum oxide 60 G, neutral (type E)	Aluminum oxide 60 G, neutral	TLC, with Gypsum	7.5	Plastic	25 kg	**1.01090.9025**
Aluminum oxide 60 G F_{254} neutral (type E)	Aluminum oxide 60 G F_{254}*1 neutral	TLC, with Gypsum	7.5	Plastic	500 g	**1.01092.0500**

Other sorbents for TLC

Description	Particle size	Package Material	Pack size/ Content	Mfr. No.
Cellulose microcrystalline	< 20 µm	Plastic	500 g	**1.02330.0500**

TLC Accessories

In addition to our diverse offering of TLC plates, we also provide other products to support your entire TLC workflow, including products for plate spotting and development, visualization, sample recovery and storage.

Description	Content of 1 package/ additional information	Mfr. No.
Application		
Hirschmann® microcapillary pipette, volume 1 - 5 µL	250 capillaries	**Z611239-250EA**
Hirschmann® microcapillary pipette, volume 20 µL	250 capillaries	**Z611247-250EA**
Developing		
TLC developing tank, rectangular; complete	1 piece (L x H x W 17.5 cm x 16.0 cm x 8.2 cm)	**Z204153-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 27.0 cm x 26.5 cm x 7.0 cm)	**Z126195-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 12.1 cm x 10.8 cm x 8.3 cm)	**Z146226-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 17.5 cm x 11.0 cm x 6.2 cm)	**Z204188-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 17.5 cm x 6.2 cm x 8.2 cm)	**Z204196-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 7.5 cm x 15.5 cm x 8.0 cm)	**Z204226-1EA**
TLC developing tank, rectangular; complete	1 piece (L x H x W 17.5 cm x 16.0 cm x 6.2 cm)	**Z204161-1EA**
TLC developing glass tank, cylindrical	1 piece (6.5 cmX 21 cm)	**Z243914-1EA**
TLC developing glass tank, cylindrical	3 piece (6.5 cmX 21 cm)	**Z243914-3x1EA**
TLC developing glass tank, cylindrical	1 piece (6.5 cmX 10.5 cm)	**Z243906-1EA**
TLC developing glass tank, cylindrical	6 piece (6.5 cmX 10.5 cm)	**Z243906-6x1EA**
Replacement lid for cylindric TLC developing tank	1 piece	**Z407259-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z126195)	**Z146218-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z146226)	**Z146234-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z204161)	**Z412058-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z204188)	**Z412074-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z204196)	**Z412082-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z204226)	**Z412090-1EA**
Replacement lid for rectangular TLC developing tank	1 piece (for Z204153)	**Z412066-1EA**
Latch-lid™ TLC developing chambers	1 piece, for use with 10 x 10 cm plates	**Z266019-1EA**
TLC saturation pads	for use with 10 cm x 10 cm plates	**Z265241-1Pak**
TLC saturation pads	for use with 20 cm x 10 cm plates	**Z265225-1Pak**
TLC saturation pads	for use with 10 cm x 20 cm plates	**Z265233-1Pak**
Plate Storage		
TLC Plate holder	1 piece	**Z265284-1EA**
TLC Plate rack	1 piece	**Z266027-1EA**
Aluminum multi-plate racks	for use with 10 cm x 10 cm plates	**Z266043-1EA**
Aluminum multi-plate racks	for use with 20 cm x 20 cm plates	**Z266035-1EA**
PTFE multi-plate racks	for use with 10 cm x 10 cm plates	**Z266078-1EA**
PTFE multi-plate racks	for use with 20 cm x 20 cm plates	**Z266051-1EA**
TLC plate storage racks	for use with 10 cm x 20 cm plates; for 10 plates	**Z266108-1EA**
TLC plate storage racks	for use with 20 cm x 20 cm plates; for 10 plates	**Z266094-1EA**
UV Detection		
UV lamp 254 nm	1 unit	**1.12537.0001**
UV lamp 366 nm	1 unit	**1.13203.0001**

Description	Content of 1 package/ additional information	Mfr. No.
UV Detection*		
Spectroline® E-series UV lamp	output 4 W, AC/DC 115 V AC	**Z169595-1EA**
Spectroline® E-series UV lamp	output 4 W, AC/DC 230 V AC	**Z169609-1EA**
Spectroline® E-series UV lamp	output 6 W, AC/DC 120 V AC	**Z169617-1EA**
Spectroline® E-series UV lamp	output 6 W, AC/DC 230 V AC	**Z169625-1EA**
Spectroline® E-series UV lamp	output 8 W, AC/DC 115 V AC	**Z169633-1EA**
Spectroline® E-series UV lamp	output 8 W, AC/DC 230 V AC	**Z169641-1EA**
Spectroline® E-series UV lamp filter	Filter, long/shortwave output 6 W	**Z169471-1EA**
Spectroline® E-series UV lamp filter	Filter, long/shortwave output 8 W	**Z169684-1EA**
Spectroline® battery-operated UV lamp	Model UV-4B, wavelength 365 nm	**Z284661-1EA**
Spectroline® battery-operated UV lamp, Replacement bulb	longwave bulb 4 W	**Z284688-1EA**
Spectroline® CM UV-viewing cabinet	Cabinet CM-24, AC/DC input 115 V AC, 60 Hz	**Z169382-1EA**
Spectroline® CM UV-viewing cabinet	Cabinet CM-24, AC/DC input 230 V AC, 50 Hz, European 2-pin plug	**Z169390-1EA**
Spectroline® CM UV-viewing cabinet	Cabinet CM-26, AC/DC input 115 V AC, 60 Hz	**Z169439-1EA**
Spectroline® CM UV-viewing cabinet	Cabinet CM-26, AC/DC input 230 V AC, 50 Hz, European 2-pin plug	**Z169447-1EA**
Spectroline® CX TM UV-viewing cabinet	Cabinet CX-20, AC/DC input 115 V AC, 60 Hz	**Z169498-1EA**
Spectroline® CX TM UV-viewing cabinet	Cabinet CX-20, AC/DC input 239 V AC, 50 Hz, European 2-pin plug	**Z169528-1EA**
Spectroline® light tube for CX TM UV-viewing cabinet	white light 8 W	**Z169560-1EA**
Spectroline® filter assembly for CX TM UV-viewing cabinet	Longwave	**Z169579-1EA**
Spectroline® E-Series lamp bulb	shortwave output 4 W	**Z169412-1EA**
Spectroline® E-Series lamp bulb	longwave output 4 W	**Z169404-1EA**
Spectroline® E-Series lamp bulb	longwave output 6 W	**Z169455-1EA**
Spectroline® E-Series lamp bulb	shortwave output 6 W	**Z169463-1EA**
Spectroline® E-Series lamp bulb	longwave output 8 W	**Z169544-1EA**
Spectroline® E-Series lamp bulb	shortwave output 8 W	**Z169552-1EA**
Derivatization/ Visualization		
Dragendorff's reagent spray solution	Acetic acid/ethyl acetate/water, 100 mL	**1.02035.0100**
Molybdatophosphoric acid	2-propanol, 100 mL	**1.00480.0100**
Ninhydrin spray solution	2-propanol, 100 mL	**1.06705.0100**
Iodoplatinate	100 mL	**I 9157**
Molybdenum	100 mL	**M 1942**
Sprayer / Spray box		
TLC Spray box	5 piece with size appr. 14 X 14 inc.	**S1509-4EA**
TLC sprayer	1 unit with two spray heads	**1.08540.0001**
Reagent Sprayer for TLC plates	1 piece, volume 250 mL	**58005**
Spray nozzles (heads) for TLC sprayer	5 pieces (0.8 mm)+ 1 piece (1.25 mm)	**1.08541.0001**
Tube-type sprayer	capacity 50 mL	**Z126292-1SET**
Bottle-type sprayer	capacity 240 mL	**Z126306-1SET**
Flask-type sprayer	size 250 mL	**Z129178-1EA**
Flask-type sprayer	size 75 mL	**Z190373-1EA**
Chromatography sprayer	size 10 mL (flask- type)	**Z529710-1EA**
Chromatography sprayer	size 50 mL (flask- type)	**Z529729-1EA**
Chromatography sprayer	size 125 mL (flask- type)	**Z529737-1EA**
Chromatography sprayer	size 250 mL (flask- type)	**Z529745-1EA**
Others		
Glass bottles 50 mL	6 bottles	**1.10647.0001**
Reagent bottles 100 mL	6 bottles	**1.10646.0001**
Adsorbent scrapers	for rapid removal of adsorbent from TLC plates	**Z265268-1EA**
Adsorbent scrapers blades	5 EA	**Z265276-1PAK**

*Short wave: 254 nm Long wave: 365 nm

plant extract reference materials

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Several additional key ingredients are qualitatively confirmed and given as peak assignments in the HPLC chromatogram delivered with the product

Product features include:

- Quantitative values for one or several key ingredients
- Qualitative values for several additional ingredients
- Secondary standard traceable to HWI primary standards
- Information leaflet includes methods for HPLC and HPTLC including chromatograms with peak/ spot assignments

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