Chromatography
for technical translators

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Chromatography

for technical translators

Topics for Today

- What chromatography is and what it is used for
  - Basic principles
  - Types
  - Equipment
- Examples
- Other types of chromatography
- Resources

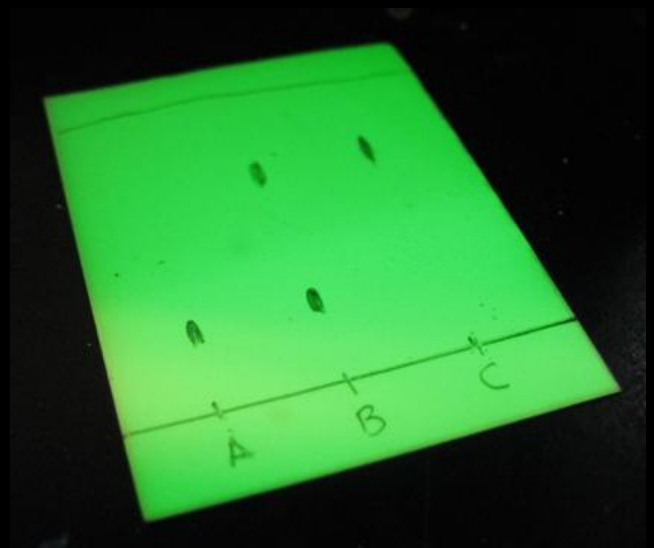
Chromatography

for technical translators

Goals for Today

- Demystify chromatography and make the content accessible to technical translators
- Show how and where descriptions of this technique will appear in source texts
- Exemplify translation approaches and strategies for correct terminology and phrasing

The world of chromatography



What chromatography is and what it is used for

- Origin, meaning, basic principles, and types
- Examples of how and where descriptions of this technique appear in source texts
- Exemplify translation approaches and strategies for correct terminology and phrasing

Chromatography
Origin and meaning

Mikhail Semyonovich Tsvet (Михаи́л Семёнович Цвет), a Russian-Italian botanist (1872–1919)
Invented column chromatography in 1903 as a method to separate chlorophylls and carotenoids (plant pigments)

Remained obscure until 1929 (published in Russian, just before 1st Russian Revolution, and two famous German chemists reported being unable to reproduce the results)

Chromatography:
from Greek χρῶμα (chroma) "color" and γράφειν (graphein) "to write“, although color no longer is important

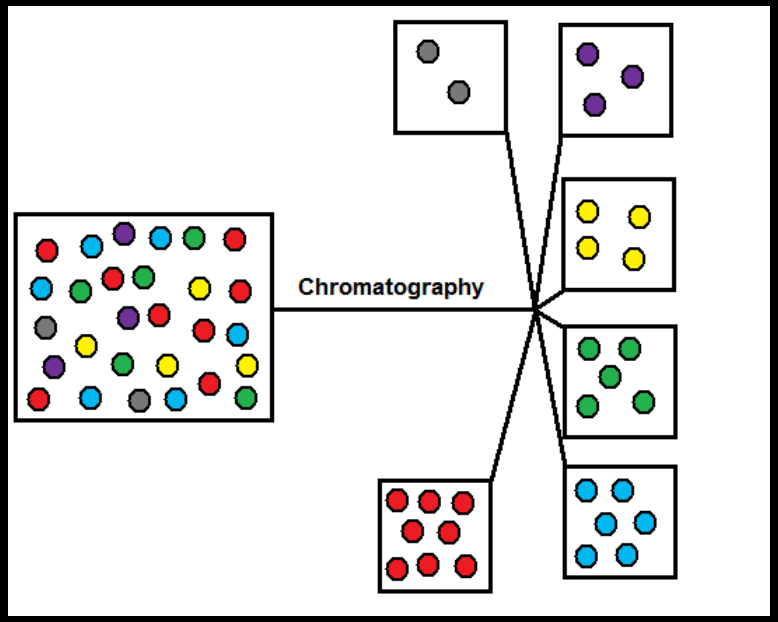
Functional definition:
separation of components in a mixture based on the relative affinities toward a mobile phase and stationary phase

Chromatography Jargon

Adsorbent	Synonym for “support” or “stationary phase”
Affinity	Physicochemical attraction between a component and the stationary and mobile phases
Baseline separation	A separation in which there are no mixed fractions
Eluate	A portion of the liquid mobile phase to have emerged from the chromatography system
Eluent	The liquid (TLC, CC, HPLC) or gaseous (GLC) mobile phase
Equilibration	Allowing an initial or intermediate stationary / mobile phase combination to achieve a steady state of saturation/adsorption
Fraction	A specified quantity of eluate in a chromatographic separation (usually column chromatography), collected in vials, test tubes, flasks, or other type of container
Origin	The place where the mixture was applied to the chromatographic system (TLC and CC)
Retention factor (R_f)	In TLC, the R_f = (distance traveled from origin by component) / (distance between the origin and the solvent front)
Retention time (R_t)	In GLC and HPLC, the R_t is the characteristic time for a component to travel through the column and be detected
Reverse(d) phase	Chromatography with the solid support that has been modified to exhibit a lipophilic (nonpolar) surface to the mobile phase
Support	The solid (TLC, CC, HPLC) or liquid (GLC) that serves as the stationary phase
Visualization	A method (destructive or non-destructive) of establishing the presence of the components after separation has taken place

Chromatography
Basic principles

Chromatography is a process by which components in a mixture or matrix can be separated, isolated, identified, quantified, and/or recovered



Chromatography
Basic principles

How does the separation take place?

Components partitioning between two phases based on affinity

(usually, mobile phase and stationary phase)

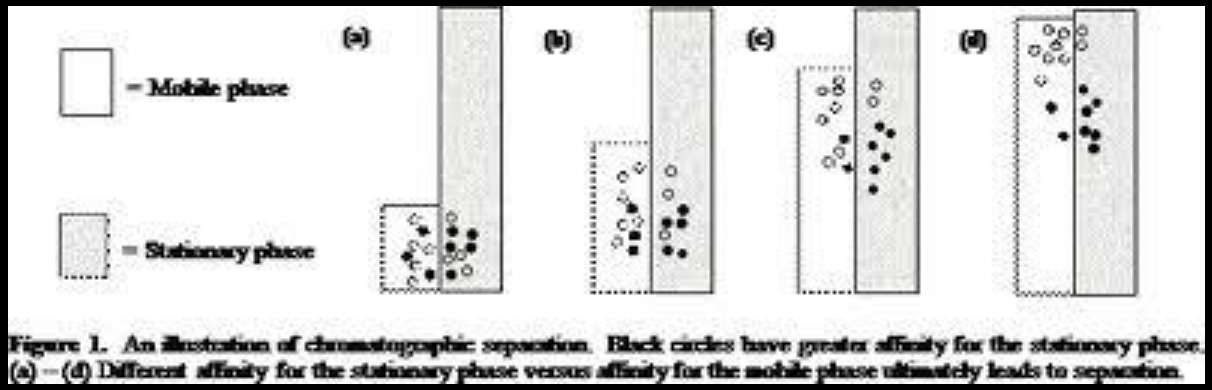


Figure 1. An illustration of chromatographic separation. Black circles have greater affinity for the stationary phase. (a) – (d) Different affinity for the stationary phase versus affinity for the mobile phase ultimately leads to separation.

Chromatography
Partitioning

How does partitioning occur?

Different affinities toward the mobile phase vs. the stationary phase

Affinity summed up is:

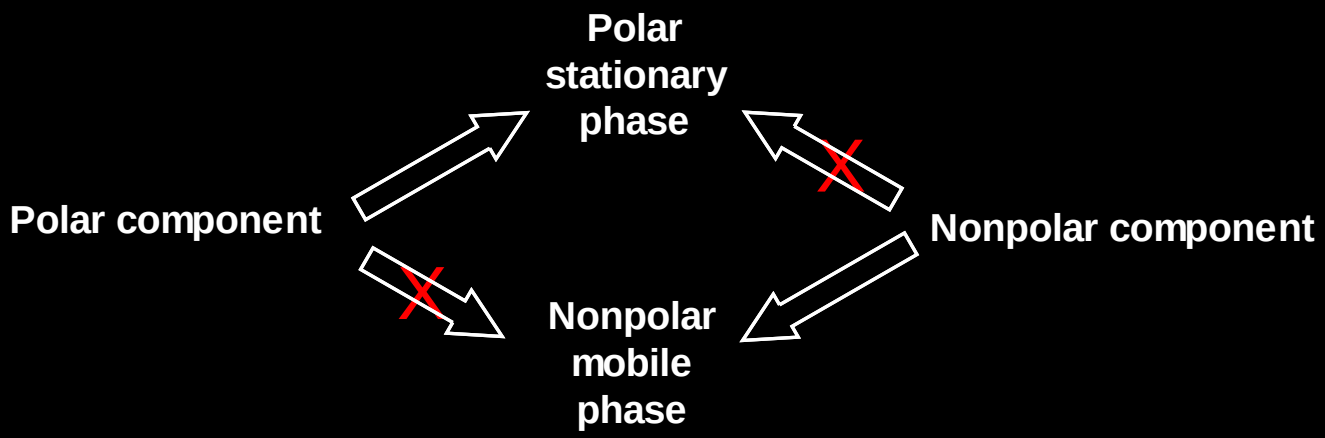
Like likes like

Chromatography
Partitioning

Most stationary phases are polar (“normal”), but can also be nonpolar (“reversed phase”)

The mobile phase (solvent or solvent mixture) can be varied between polar and nonpolar

The stationary and mobile phases are selected judiciously (experience)



Chromatography
Partitioning

What is the physical/molecular basis for affinity?

Hydrogen bonding
Dipoles
Charge transfer complexation
van der Waals forces
Size and/or shape

Polar	Nonpolar
Hydrophilic (water-like)	Lipophilic (fat- or hydrocarbon-like)
High dipole moment	Low dipole moment
Ionic interactions	Nonionic interactions

Chromatography
Partitioning

Easier to visualize in videos

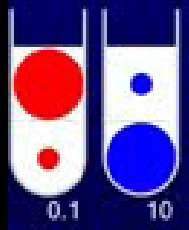
first

Two components with different affinities

then

Three components with different affinities

See:
Joost de Folter
[http://joostdefolter.info/]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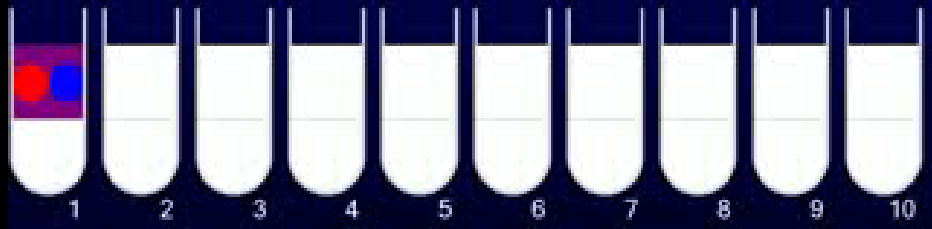
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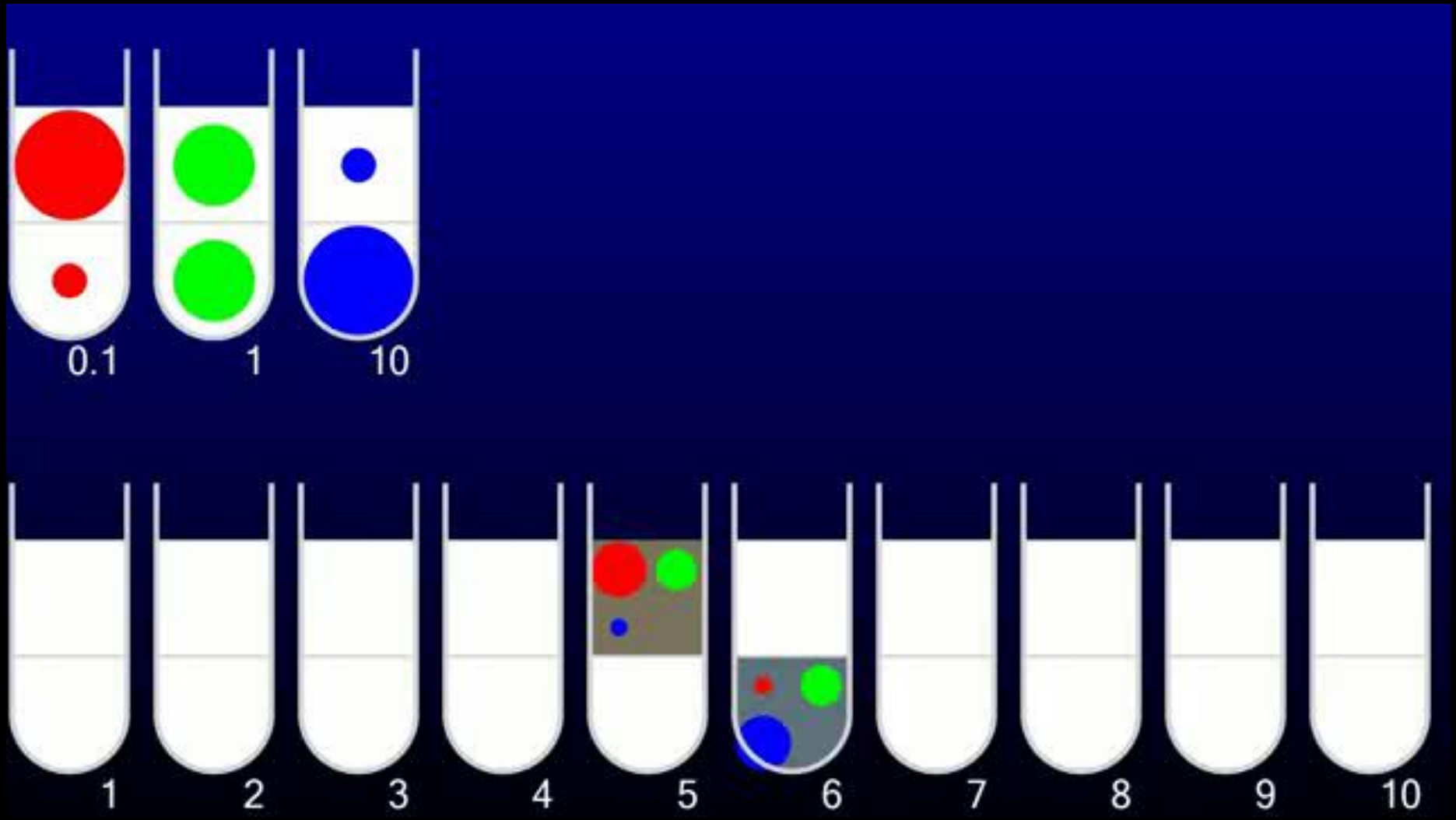
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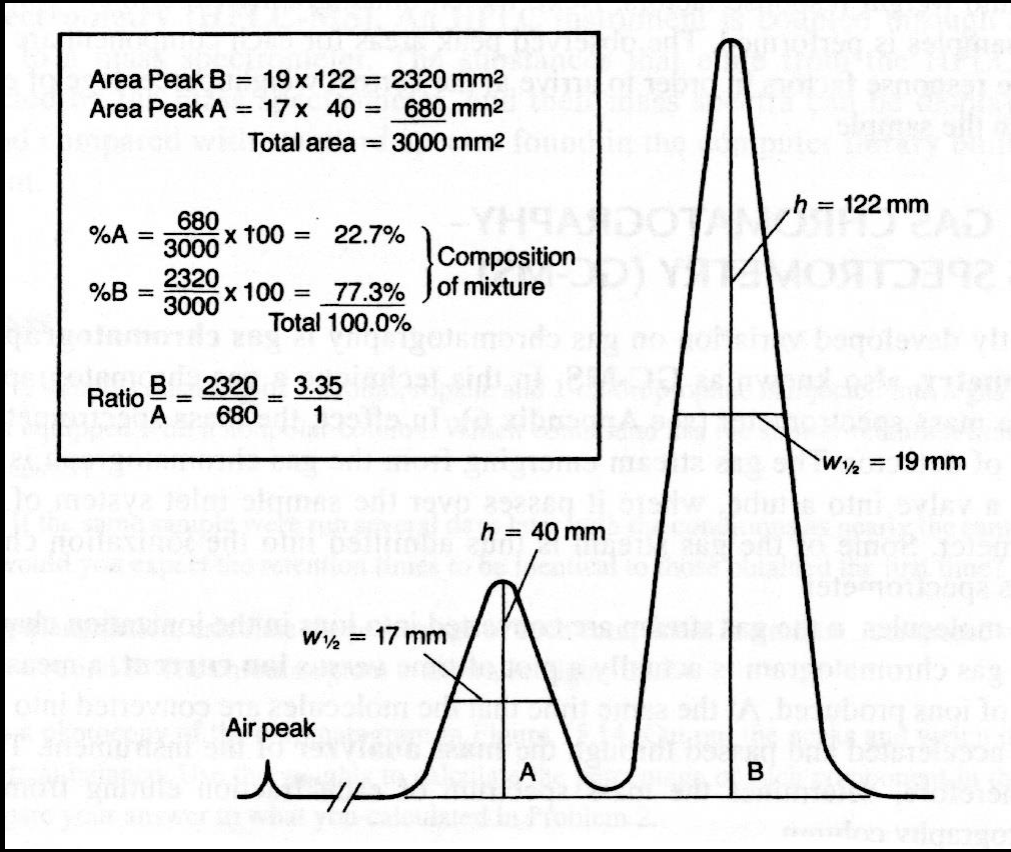
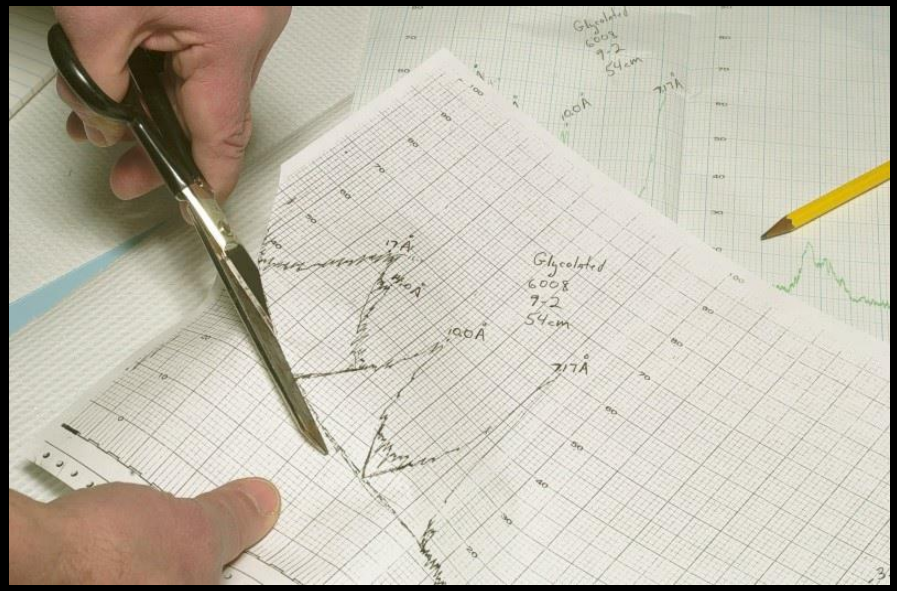
Chromatography
Peak areas

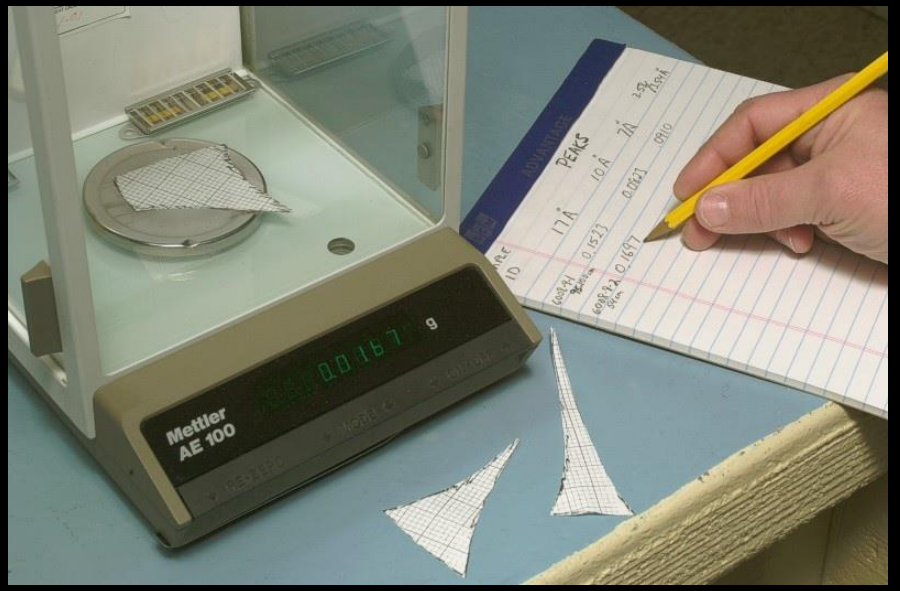
HPLC and GLC systems produce a printed (or now digital) recording of peaks for the components that have eluted. The relative areas of these peaks are proportional to the relative amounts of the components .



Chromatography
Peak areas

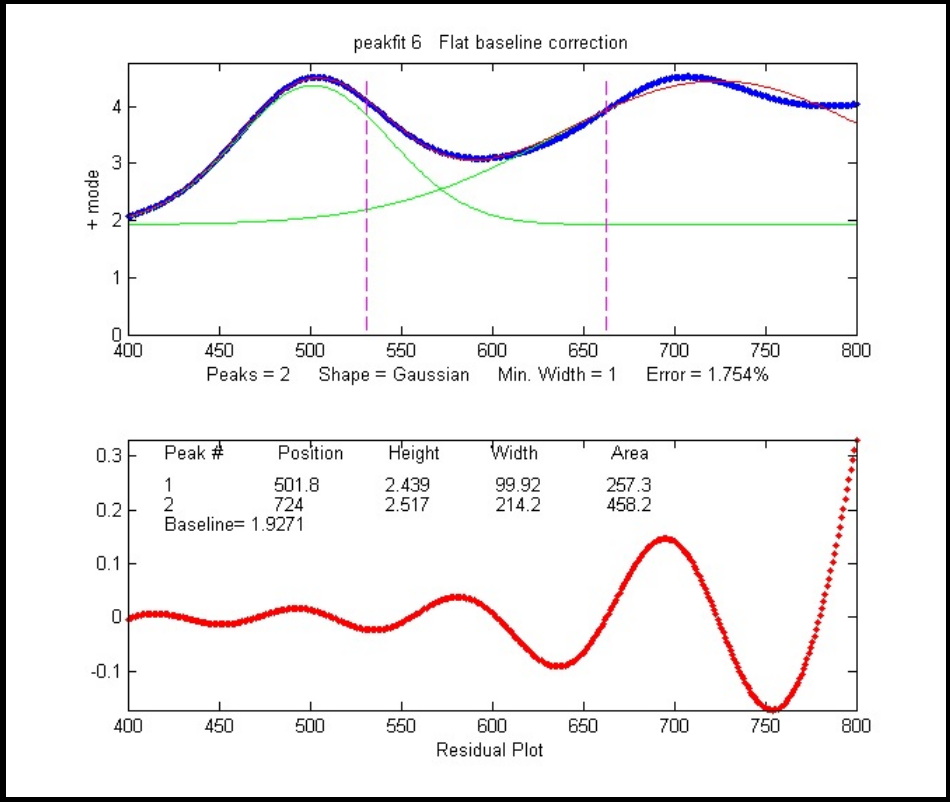
In the pre-digital ages, the state of the art was to cut out the peaks on the chart paper and weigh these pieces to determine the relative areas.





Chromatography
Peak areas

Now, even when there is no baseline separation, the peaks shapes are modeled from the digitized data, modeled using a regression analysis, and the relative areas are determined by computation.



No scissors required!

Chromatography
Types

Four main types that translators encounter:

Thin Layer Chromatography (TLC)

Column Chromatography (CC)

High Pressure/Performance Liquid Chromatography (HPLC)

Gas (Liquid) Chromatography (GC/GLC/VPC)

Thin Layer Chromatography (TLC)

Mainly for analytical use (identification)

Stationary phase: usually a thin layer of metal oxide (silica, alumina, possibly modified) in a binder on a glass, plastic, or metal substrate

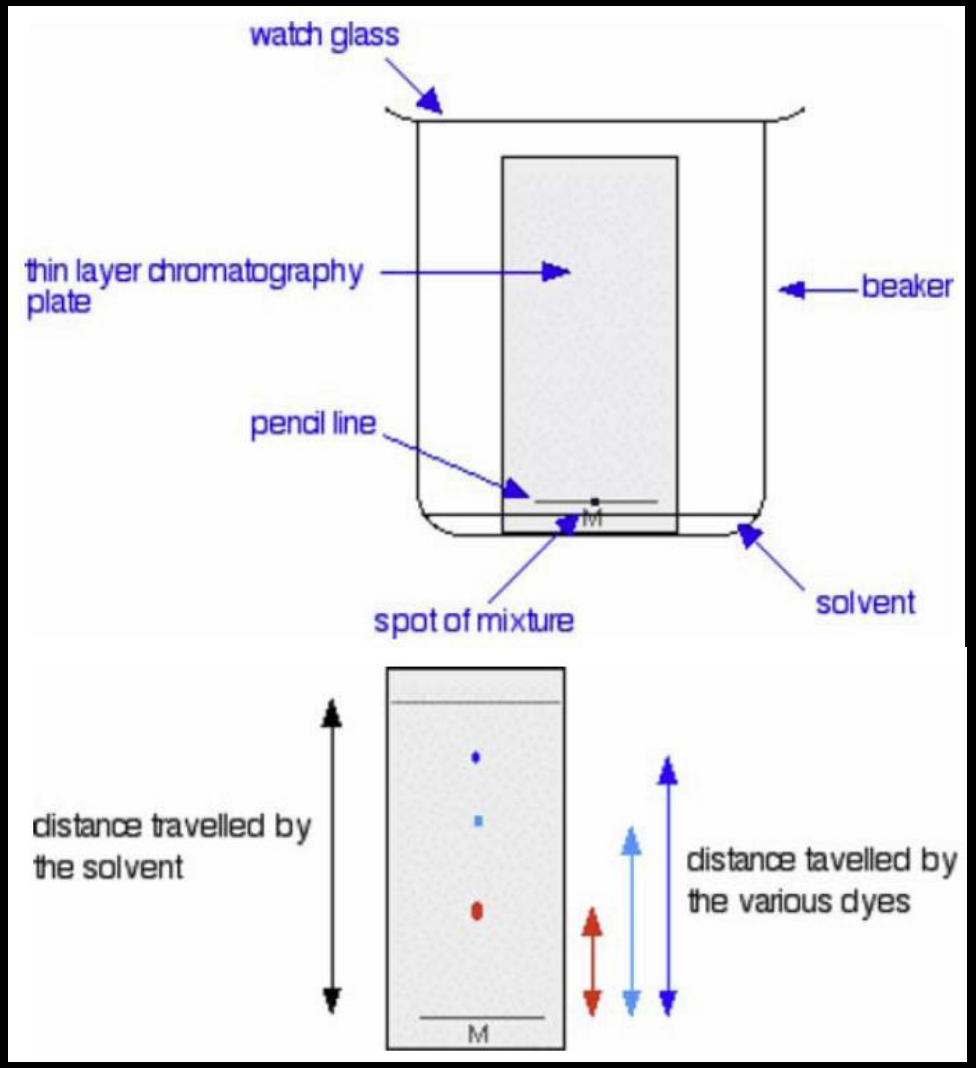
Mobile phase: solvent or solvent mixture

Equipment: TLC plate, spotter, sample solution, standard solution(s), developing tank, eluting solvent

Thin Layer Chromatography (TLC)

The set-up: developing chamber is a beaker topped with a watch glass
A pencil line has been drawn along the bottom of the plate, above level of the solvent.
Mixture (M) is spotted in the center

Three components have eluted at different rates. Measurements will show each component to have a characteristic retention factor, R_f (perversely, IUPAC calls this "*k*")



Jim Clark
Chemguide 2007
http://www.chemguide.co.uk

TLC Plates

Thomas Scientific
www.thomassci.com/Supplies/TLC-Plates-And-Sheets/_/Bakerflex-Coated-TLC-Aluminum-Oxide-Sheets

Chromatotron
Centrifugal Thin-Layer Chromatograph
T-Squared Technology, San Bruno, CA
tsqtech.com/products/harrison-research/

Column Chromatography (CC)

Mainly for preparative use

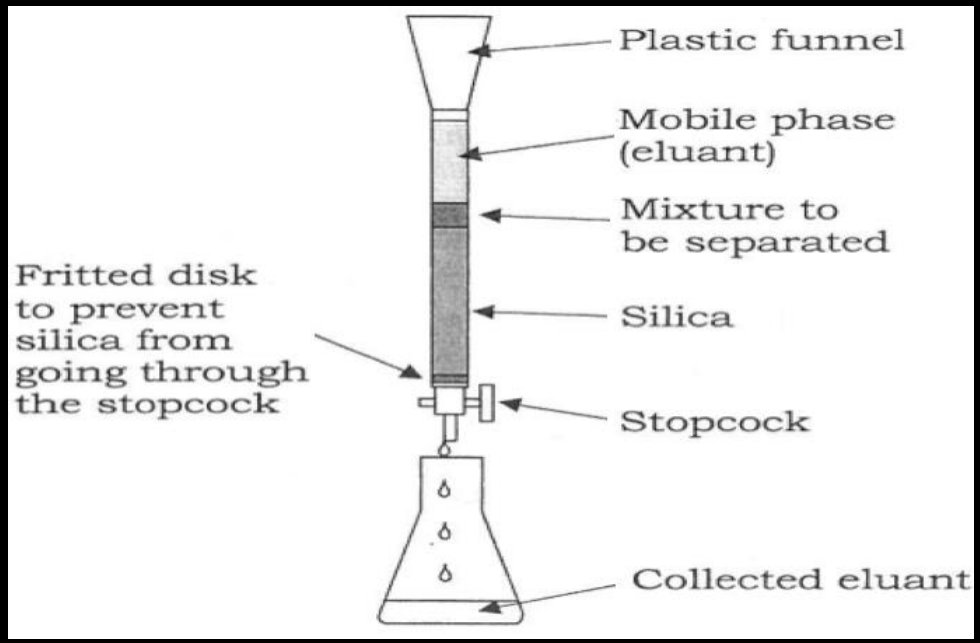
Stationary phase: usually a column of metal oxide (silica, alumina, possibly modified) as a slurry in the mobile phase solvent (mixture)

Mobile phase: solvent or solvent mixture

Equipment: glass or metal column, top layer packing, sample solution, eluting solvent, fraction collecting system, optionally pressure apparatus

Column Chromatography (CC)

A classical set-up: column with a fritted disk and stopcock on the bottom.
The silica gel is slurried in the initial solve (mixture) to be used, and the slurry is poured into the column, and allowed to settle.
Solvent level is dropped to the top of the silica column, and the mixture to be separated is added carefully to the top of the column
A guard layer (sand or glass wool) is added at the top, then more solvent is added, and elution is begun.
Fractions are collected at the bottom.



Nicolas
Odinity 2014
www.odinity.com/thin-layer-column-chromatography/

Column Chromatography Columns

Adams & Chittenden Scientific Glass
Berkeley, CA
adamschittenden.com/chromatography.html

University of Colorado
orgchem.colorado.edu/Technique/Procedures/Columnchrom/Procedure.html

CAMAG
www.camag.com/en/alox.cfm

HPLC

For either analytical or preparative use

Stationary phase: prefabricated column packed with metal oxide (silica, alumina, possibly modified) or an organic polymeric material. Must be pre-equilibrated with the mobile phase

Mobile phase: solvent or solvent mixture

Equipment: HPLC system: solvent reservoir, degassing, gradient selection and mixing system, high-pressure pump, sample injection system, pre-column (guard column), analytical column, detector, data acquisition unit, fraction or waste collector.

HPLC

HPLC system schematic.

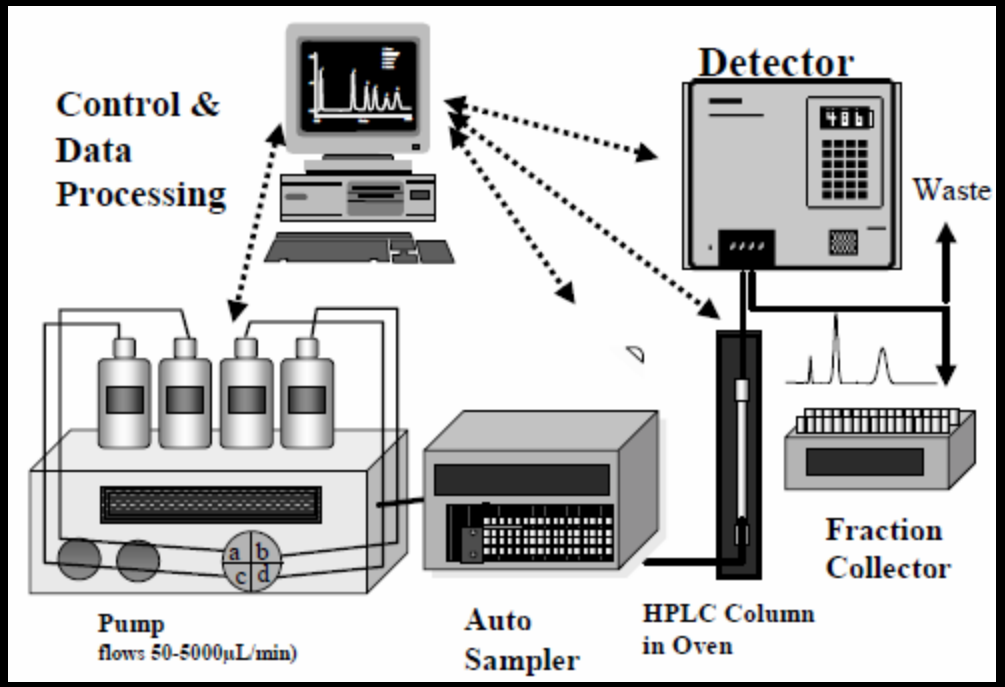
System is managed by a work station.

4 solvent reservoirs connected to a pump and mixing system (solvent program).

Autosampler is the injection system.

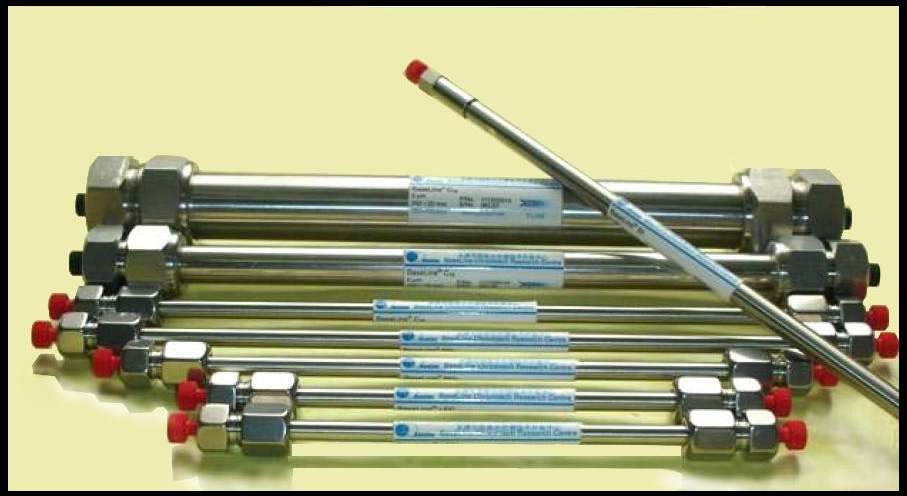
HPLC column is in an oven for temperature control (thermal program).

Flow stream passes through a detector (UV, IR, OD, etc.) and to a fraction collector or waste stream diverter



Dr. Shulamit Levin
Medtechnica
www.forumsci.co.il/HPLC/HPLC_overview_handouts2002.pdf

HPLC columns



天津市倍思乐色谱技术开发中心
Tianjin BaseLine ChromTech Research Centre
http://www.qiuhuan.com/product-chrom.html

Contact Crelab Instruments AB, Sweden
http://www.crelab.se/nyheteronews.html

GC/GLC/VPC

For analytical or micro-preparative use

Stationary phase: prefabricated column packed with viscous liquid or semisolid adsorbent on an inert support. Must be pre-equilibrated with the mobile phase

Mobile phase: gas or gas mixture

Equipment: GC system: solvent reservoir, degassing, gradient selection and mixing system, high-pressure pump, sample injection system, pre-column (guard column), analytical column, detector, data acquisition unit, fraction or waste collector.

GLC

GLC system schematic.

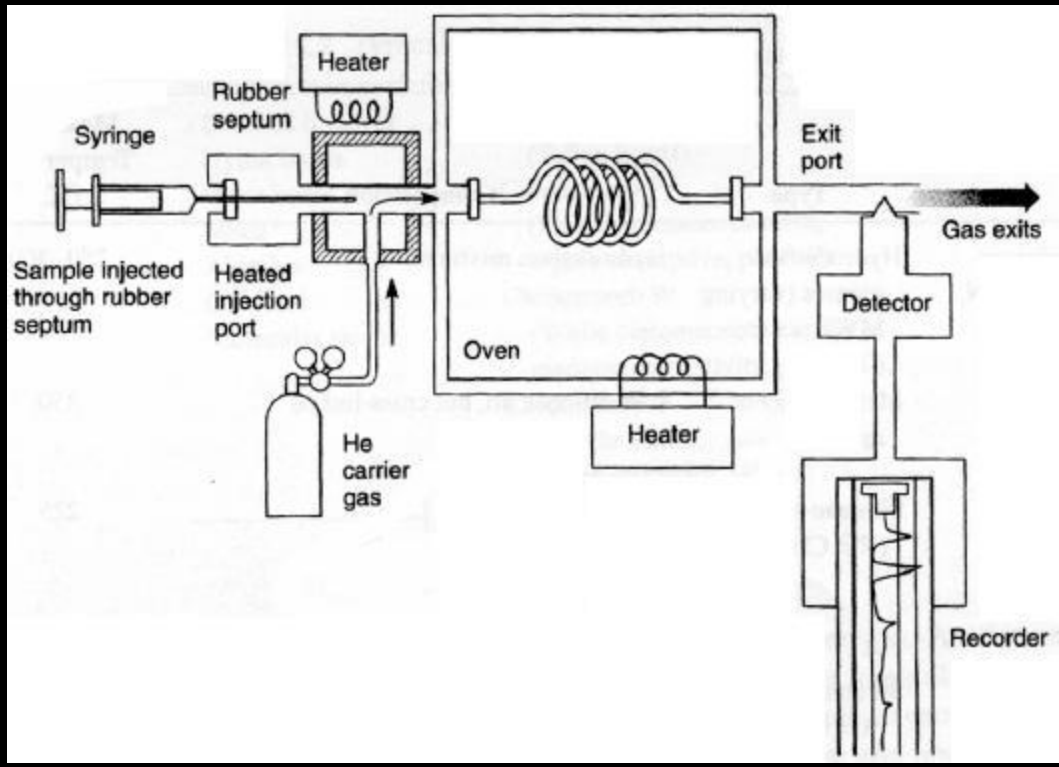
System is also managed by a work station (not shown).

He gas tank provides mobile phase and pressure.

Injection port is heated separately from column.

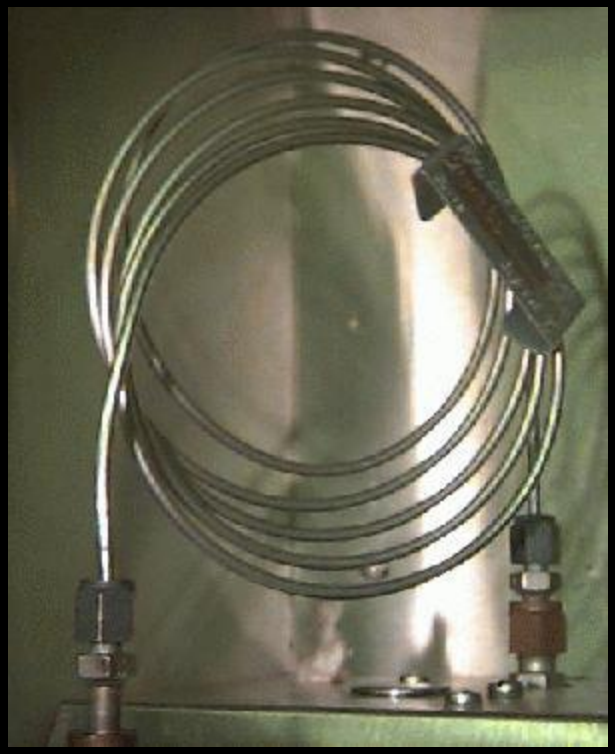
GLC column is in an oven for temperature control (thermal program).

Flow stream passes through a detector (flame ionization (FI) or thermal conductivity (TC)) and to an exhaust diverter



University of Arizona
quiz2.chem.arizona.edu/vip/chromatography/GC/apparatus.htm

GLC columns



Traditional metal column (aluminum)

Glass capillary column

Brian M. Tissue, 1996
Korea Advanced Institute of Science and Technology
http://elchem.kaist.ac.kr/vt/chem-ed/sep/gc/gc.htm

Examples

Where and how descriptions of chromatography appear in source texts

Where does chromatography appear?

- Patents
- Scholarly articles
- Standard Operating Procedures
- Manufacturing sheets
- Test protocols

Thin Layer Chromatography
Dünnschichtchromatographie (DSC)

R_f = (distance traveled from origin by component) / (distance between the origin and the solvent front)

The R_f is a characteristic value that depends on the solvent and stationary phase, which should be quoted, e.g.:

f) 2-/(6-Aminohexyl)-äthyl-amino/-4-morpholino-thieno/3,2-d/-pyrimidin

aus 2-/(6-Chlorhexyl)-äthyl-amino/-4-morpholino-thieno/3,2-d/-pyrimidin und Phthalimid-Kalium und Hydroxylamin.

Gelbes Öl (R_F = 0,5, Kieselgel, Methanol/Ammoniak 9 : 1)

Yellow oil (R_f = 0.5, silica gel, methanol/ammonia (9:1)

From: patent DE 2032687 A1 (1972)

Thin Layer Chromatography
薄層クロマトグラフィー

試料溶液0.01mlを 薄層クロマトグラフ用シリカゲルを用いて調製 した薄層板にスポットする。次にヘキサン・ベンゼン・酢酸エチル混液(14:3:3)を展開溶媒として約10cm展開した後,薄層板を風乾する。これに噴霧用p-ジメチルアミノベンズアルデヒド試液を均等に噴霧した後,100° Cで5分間加熱する時,Rf値0.5～0.7に緑色～灰緑色のスポットを認める。

0.01 mL of the test solution was spotted on a thin layer chromatography plate prepared using silica gel for TLC. Next, this was developed to a distance of 10 cm using a developing solvent mixture of hexane / benzene / ethyl acetate (14:3:3), after which the TLC plate was dried in air.
This plate was sprayed evenly with a p-dimethylaminobenzaldehyde spray, and after heating to 100 °C for 5 min, green to gray-green spots were observed at R_f 0.5-0.7.

日本東洋醫學會誌 [Nihon tōyō igaku zasshi] ***1981*** *32(4) 227-228*

Thin Layer Chromatography
Chromatographie a couche mince (CCM)

Les lipides de chaque échantillon sont dissous dans le chloroforme et déposés sur la plaque à l'àide d'une microseringue de 10 ou 25 microlitres. Les plaques sont ensuite placées dans la chambre à chromatographie où la migration s'effectue. La phase mobile est constituée d'un mélange $CHCl_3$: MeOH : H_2O (65 : 35 : 4). La révélation se fait par un réactif mis au point par Ryu et MacCoss (1979) qui colore tous les phospholipides en bleu immédiatement après la vaporisation. Tous les lipides sont ensuite révélés par chauffage de la plaque. Des images de ces plaques sont obtenues par reprographie et les chromatogrammes sont obtenus au moyen d'un densitomètre à balayage (Clifford Instruments, modèle 445).

The lipids samples were dissolved in chloroform and spotted on (TLC) plates using a microsyringe (10 or 25 µL). The plates were then placed in a developing chamber where they were developed. The mobile phase was a mixture of $CHCl_3$/MeOH/H_2O (65:35:4). Visualization was achieved after evaporation using the reagent developed by Ryu and MacCoss (1979) that colors all phospholipids blue. The lipids were visualized by heating the plates. Images of the plates were obtained by reprography and the chromatograms were obtained using a scanning densitometer (Clifford Instruments, model 445).

From Johanne Baribeau M.S. dissertation (Université du Québec à Trois-Rivières,1984)

Column Chromatography

Cromatografía en columna

Teniendo la columna preparada, se disolvió la muestra 4.2.3. en la menor cantidad posible del respectivo solvente cromatográfico y con una pipeta fue agregada gota a gota en la columna; para transferir toda la muestra a la columna hubo necesidad de lavar el vaso de precipitados (que contenía la muestra) con 3 o 4 porciones de 1 ml. del mismo solvente, las cuales fueron adicionadas a la columna como se indicó anteriormente y procurando que la altura del solvente no sobrepasara la del adsorbente en más de 1 cm., una vez agregada toda la muestra, en forma continua se siguió adicionando el solvente cromatográfico, evitando que superara la altura del adsorbente en más de 2 cm.; en el momento en que la banda amarilla estuvo cerca de la lana de vidrio, se cambió el recipiente en que se estaba recibiendo, por un vaso de precipitados de 100 mL seco y se dejó salir la solución amarilla hasta que dicha banda fue eluída completamente.

Taking the prepared column, sample 4.2.3. was dissolved in the minimal amount of the corresponding chromatographic solvent ,and this was applied dropwise to the column using a pipette; to transfer the entire sample to the column, it was necessary to rinse the sample beaker with 3 or 4 portions of 1 mL of the same solvent. These were applied to the column as above while ensuring that no more than 1 cm of solvent is present above the adsorbent. Once the entire sample has been applied, the solvent is added continuously while ensuring that no more than 2 cm is present above the adsorbent. When the yellow band was close to the glass wool, the receiver was exchanged for a dry 100 mL beaker and the yellow solution was passed into this until that band had completely eluted.

From: Revista Colombiana de Ciencias Químico-farmacéuticas 1973 (purification of α- and β- carotenoids)

Column Chromatography
カラムクロマトグラフィー

得られたＨ２Ｏ移行部エキスを逆相シリカゲルカラムクロマトグラフィー［１．０ｋｇ，Ｈ２Ｏ→ＭｅＯＨ］で糖除去し、ＭｅＯＨ流出部エキス（１３ｇ，１．７％）を得た。ＭｅＯＨ流出部エキス１３ｇを順相シリカゲルカラムクロマトグラフィー｛１．０ｋｇ，［ＣＨＣｌ３：ＭｅＯＨ＝１０：１→３：１→１：１］→［ＣＨＣｌ３：ＭｅＯＨ：Ｈ２Ｏ＝６５：３５：１０（下層）→６：４：１］→ＭｅＯＨ｝で分離し。　。　。

Sugar removal from the aqueous extract was accomplished via reverse phase silica gel column chromatography [1.0 kg, H_2O → MeOH] to obtain a MeOH elutable extract (13 g, 1.7%) was obtained. The 13 g of MeOH elutable extract was separated via normal phase silica gel column chromatography {1.0 kg, [$CHCl_3$/MeOH 10:1 → 3:1 → 1:1] → [$CHCl_3$/MeOH/H_2O 65:35:10 (lower layer) → 6:4:1] → MeOH}…

From patent JP H10-265425 A (1998)

Column Chromatography
Säulenchromatographie

2-(2-Amino-äthylamino)-4-diäthanolamino-7-methyl-thieno/3,2-d7-pyrimidin-dihydrochlorid

2,87 g (0,01 mol) 2-Chlor-4-diäthanolamino-7-methyl-thieno-/3,2-d7pyrimidin (dargestellt aus 2,4-Dichlor-7-methyl-thieno-/3,2-d7pyrimidin und Diäthanolamin) und 10 ml 1,2-Diaminoäthan werden 4 Stunden auf 120°C erhitzt. Danach destilliert man das überschüssige Amin im Vakuum ab und reinigt den Rückstand säulenchromatographisch (Sorbens: Kieselgel für Säulenchromatographie, 0,2 - 0,5 mm, Merck; Laufmittel: Methanol/konz. Ammoniak = 9 : 1).

<...>

Then the excess amine was distilled off under vacuum, and the residue was purified by column chromatography. (Adsorbent: silica gel for column chromatography, 0.2–0.5 mm, Merck; eluent: methanol/conc. Ammonia = 9:1).

From: patent DE 2032687 A1 (1972)

TLC & Column Chromatography
CCM & Chromatographie sur colonne

Les chromatographies sur couche mince ont été effectuées sur des plaques de gel de silice (0.25 mm, 60F-250(Merck)). Les produits ont été révélés à l'aide d'une lampe UV et avec le $KmnO_4$ ou le Molybdène. Les purifications par chromatographie éclaire ont été faites avec du gel de silice Merck Kieselgel 60 (230-400 mesh).

…

L'huile orange obtenue est purifiée par chromatographie éclaire sur gel de silice (100% hexane) pour donner le produit **2** (4.13g, 75%) sous forme d'huile incolore.

Thin layer chromatography was carried out on silica gel plates (0.25 mm, 60F-250 (Merck)). The products were visualized using a UV lamp and with $KMnO_4$ or phosphomolybdic acid. Flash chromatography was carried out on Merck Silica Gel 60 (230-400 mesh).

…

The orange oil obtained was purified by flash chromatography on silica gel (100% hexane) to give the product **2** (4.13 g, 75%) as a colorless oil.

From: Amélie Dion, Université de Sherbrooke, 2002

Gas Chromatography
Chromatographie en phase gazeuse

Conditions opératoires :
Colonne capillaire DBWAX (polaire)
Gaz vecteur (carrier) : Azote a un debit de 1 mL/mn
Gaz de la flamme du detecteur (FID°) : - Hydrogene mL/mn (60 kPa)
- Air mL/mn (100 kPa)
Temperatures : injecteur (inlet) : 240°C
four (oven): programme a gradient de temperature
detecteur (detector) : 250°C
Exploitation des resultats : logiciel AZUR
Volumes injectes : 1µL mesures a la seringue "Hamilton" ; injecteur ≪ split ≫ 1/50.

Conditions:
Column: capillary column, DB-WAX (polar))
Carrier gas: nitrogen; flow rate: 1 mL/min
Detector gas: FID; hydrogen (60 kPa) / air (100 kPa).
Temperature: injector: 240 °C
oven: temperature gradient program
detector: 250 °C
Data processing: AZUR software
Injection volume: 1 µL (Hamilton syringe); injector split: 1/50

From: Dr. Fabien Danieau, University of Rennes
fdanieau.free.fr/cours/bts/A2/biochimie/TP/TP13DosageAlcoolCPG.pdf

Gas Chromatography
ガスクロマトグラフィー

これらの試料の分析には、検出器として水素炎イオン化検出器を備えた島津製GC-4BPTF を用いた。ガラスカラムは2m×3mm (内径〕のものを用い、粒子80~100 メッシュのChromasorb WAW にReople X400をコーティングした充填剤を満たし、分析に供した。
分析条件は、カラム温度;200°C、 Sensitivity; 10^2、Range; 8、キャリヤーガスN_2;6.0 Kg/cm^2、 H^2; 0.6~0.7 Kg/cm^2、 Air; 1. 0 Kg/cm^2 とし分析記録器のチャートスピードは10mm/min、1検体の分析時間は15分間とした。

These samples were analyzed on a Shimadzu GC-4BPTF equipped with a hydrogen flame ionization detector. A glass (capillary) column was used, 2 m × 3 mm (ID), filled with Reople* X400 coated onto Chromosorb WAW, particle size: 80–100 mesh.
Analysis conditions: column temperature: 200 °C; sensitivity: 10^2; range: 8; carrier gas N_2; 6.0 kg/cm^2; H_2; 0.6–0.7 kg/cm^2; air: 1.0 kg/cm^2; recorder chart speed: 10 mm/min; the analysis time was 15 minutes per sample.

From: 日本口腔外科学会雑誌 [*nihon kōkūgekagakkai zasshi*] **1989** 35(2) 309-314 (Japan J Oral Maxillofacial Surgery)

HPLC
(Chromatographie Liquide Haute Performance)

Matériel
Le matériel utilisé pour l'analyse des méthylxanthines par CLHP est le suivant :
-Pompe : PHILIPS modèle PU 4100, avec système de gradient et chambre thermostatée pour la colonne.
- Injecteur automatique : PHILIPS modèle "MARATHON".
- Colonne : SUPELCO modèle Supelcosil LC - 18 (5 µm), 250x4,6 mm, précédée d'une colonne de garde de 3 cm.
- Détecteur : PHILIPS modèle PYE UNICAM PU 4021, à barrettes de diodes.
- Interface Détecteur/Microordinateur : PHILIPS modèle PU 6030 DCU.
- Système d'intégration : logiciel d'intégration PU6000.

Equipment:
The following equipment was used for the HPLC analysis of methylxanthines
Pump: Philips PU 4100, with a gradient system and thermostated column chamber
Automatic injector: Philips "Marathon"
Column: Supelco Supelcosil LC-18 (5 µm), 250×4.6 mm, preceded by a 3 cm guard column
Detector: Philips Pye Unicam PU 4021, diode array.
Detector/microcomputer interface: Philips PU 6030 DCU
Integration: PU 6000 integration software

From: Denis Sylvain, PhD dissertation, Université Montpellier II (1996)

HPLC
(高性能 / 高速 / 高圧液体クロマトグラフィー)

HPLC 測定条件
測定条件は菅瀬と津田の方法10)を参考に設定した。分析にはHPLC（送液ポンプPU-980, フォトダイオードアレイ紫外可視検出器MD-910, JASCO社製）を用い、カラムにはSHISEIDO CAPCELL PAK AQ (3 mm i.d.×250 mm, 資生堂社製）を用いた。測定は移動相に50 mM リン酸緩衝液（pH 2.2）を用い、流速0.4 ml/min、カラムオーブン温度40°C、サンプル注入量10 µl、検出波長231 nm で15分間測定を行った。.

HPLC measurement conditions:
The measurement conditions were established by reference to the method of Sugase & Tsuda. The HPLC system used for the analysis was equipped with a PU-980 feed pump, and an MD-910 UV-vis photo diode array detector (Jasco). The column was a Shiseido Capcell Pak AQ (3 mm ID × 250 mm). The measurements were performed with 50 mM phosphate buffer (pH 2.2) as the mobile phase, and with a flow rate of 0.4 mL/min, column oven temperature of 40 °C, sample injection volume of 10 µL, and detector wavelength of 231 nm, the measurements were carried out over a period of 15 min.

From: 日本法科学技術学会誌 [Nihon hōkagaku gijutsu gakkaishi] ***2008*** *13(1) 17-23 (Japan J Forensic Sci Technol)*

HPLC

(Hochleistungsflüssigkeitschromatographie Hochdruckflüssigkeitschromatographie)

Geräte

Für die Hochdruckflüssigkeitschromatographie verwendeten wir ein Gerät Perkin-Elmer Modell 1250 mit UV-Detektor bei 254 nm. Die Stahlsäule, 25 cm X 4 mm, enthielt ein C_{18}-Reversed-Phase-Material auf Merck (Darmstadt, B.R.D.) LiChrosorb Si-100 (Korngrösse 10 µm) und wurde bei Zimmertemperatur betrieben. Der Druck betrug 750 p.s.i., die Durchflussgeschwindigkeit 0.75 ml/min und der Papiervorschub 5 mm/min.
Die mobile Phase bestand aus Mischungen von Methanol-Wasser, die zwischen 60-100% Methanol variiert wurden.

Equipment:

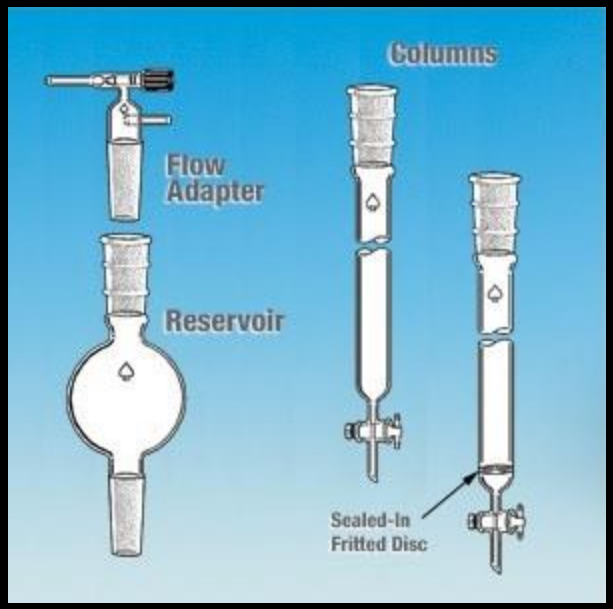
HPLC was performed using a Perkin Elmer 1250 system with a UV detector at 254 nm. The steel column (25 cm × 4 mm) contained LiChrosorb Si-100 (particle size: 10 µm), a C18 reverse phase adsorbent from Merck (Darmstadt), and was used at room temperature. The pressure was 750 psi, flow rate was 0.75 mL/min, and recorder chart speed 5 mm/min.
The mobile phase was a methanol/water mixture that was varied between 60-100% methanol.

*From: Journal of Chromatography **1977** 132 83-90*

Other Types of Chromatography

Flash (Medium-pressure) Chromatography

(then, ~mid 70s)



(Ace Glass)

(now)

(Sepracore)

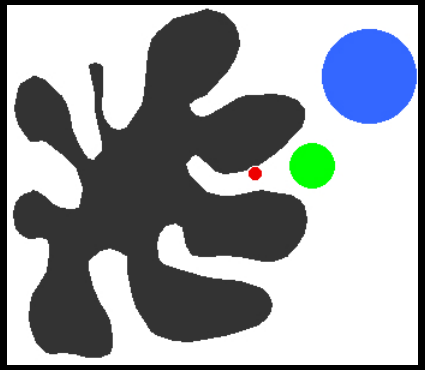
Uses smaller mesh silica gel (better resolution) and pressure (faster)

Other Types of Chromatography

Gel Permeation Chromatography (GPC)

or

Size Exclusion Chromatography (SEC)



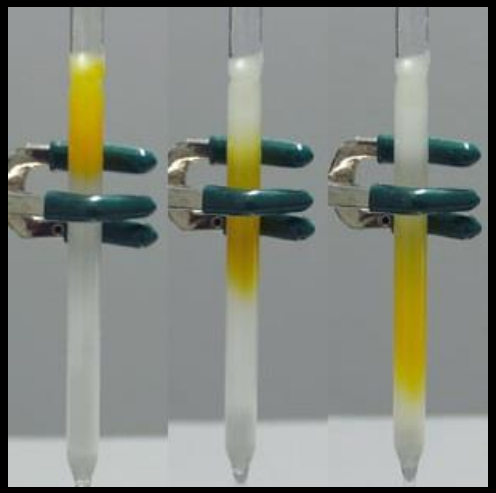
Discriminates between components of different sizes

Good for separating polymers of different sizes

Can characterize the molecular weight distribution in a polymer mixture

Other Types of Chromatography

Slug Chromatography



Basically a filtration through a short column (plug, or slug) of silica gel

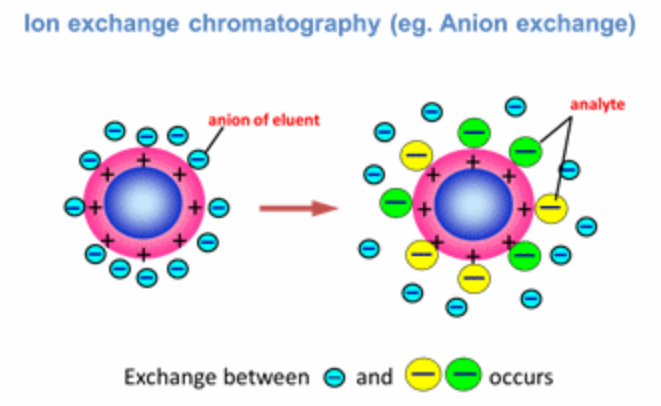
Often utilizes disposable glass pipettes as the column

Removes high polar compounds, inorganic salts, polymeric material

Sometimes used as a minimal reaction work-up

Other Types of Chromatography

Ion exchange chromatography



Stationary phase is an ionic resin, either cationic (+) or anionic (–)

Used widely to purify biological molecules

Oppositely charged components bind to the resin, other materials are washed away

Chromatography Resources

General Information on Chromatography

en.wikipedia.org/wiki/Chromatography
en.wikipedia.org/wiki/Thin-layer_chromatography
en.wikipedia.org/wiki/Column_chromatography
en.wikipedia.org/wiki/Gas_chromatography
en.wikipedia.org/wiki/High-performance_liquid_chromatography

EN glossaries

www.muszeroldal.hu/assistance/elvfog.pdf
www.separatedbyexperience.com/library/article.aspx?id=37
hplc.chem.shu.edu/NEW/HPLC_Book/glossary/define.html
goldbook.iupac.org/

DE glossaries

www.dyerlabs.com/chemistry/glossary.html
www.analytik.de/content/view/3841/663/
chem.uft.uni-bremen.de/Chromatography/glossar.htm
www.analytik-news.de/Glossar/Chromatographie.html

ES glossary

html.rincondelvago.com/cromatografia_6.html

FR glossary

www.masterchimie1.u-psud.fr/Chromatoweb/Glossaire.html

JA glossaries

www.jaima.or.jp/jp/basic/chromatograph/
www.shse.u-hyogo.ac.jp/kumagai/eac/ea/chromato.htm/

What was accomplished today (hopefully)

- Chromatography was demystified
- Gained understanding of basic concepts
- Introduced to four major types of chromatography, and several additional types
- Learned some English chromatography jargon, and equivalent jargon in several other languages
- Know how to research chromatography content and discover resources

Chromatography
for technical translators

ATA 55th Annual Conference
Chicago - 8 November 2014

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