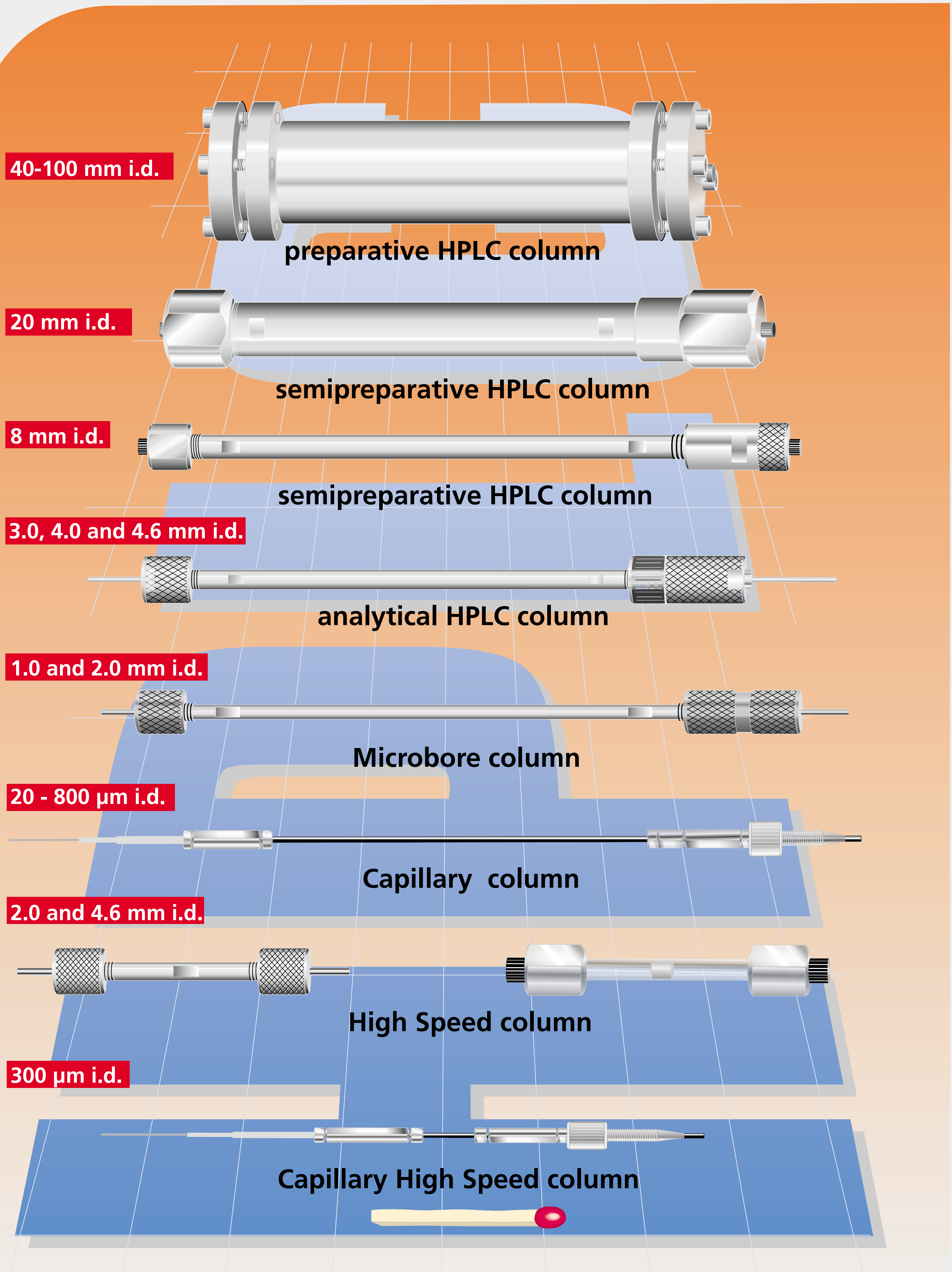
Huge Variety of Dimensions

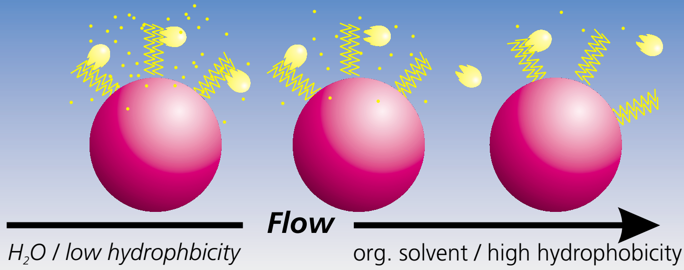


Note! Refill of microbore, analytical or preparative columns saves costs over the life of the hardware.

Hugh Variety of Selectivity

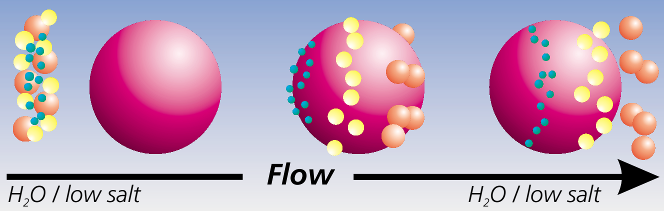
Reversed Phase Chromatography

***GROM*-Sil Phases**
(All commonly available packings from other manufacturers)



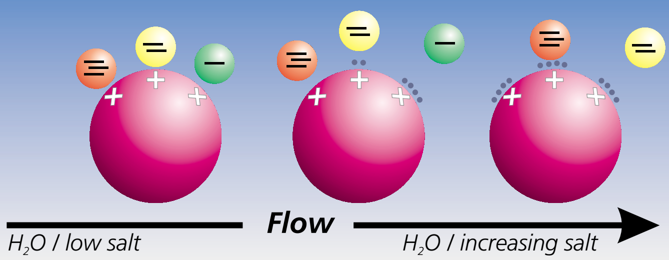
Size Exclusion Chromatograpy

Novarose SE - 100/17
Toyopearl HW
GROM Gel GPC



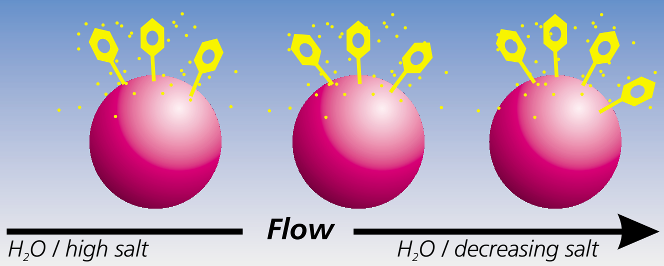
Ion Exchange Chromatography

Toyopearl CM, –SP, –DEAE, ...
TSK-Gel SP-5PW, –DEAE-5PW



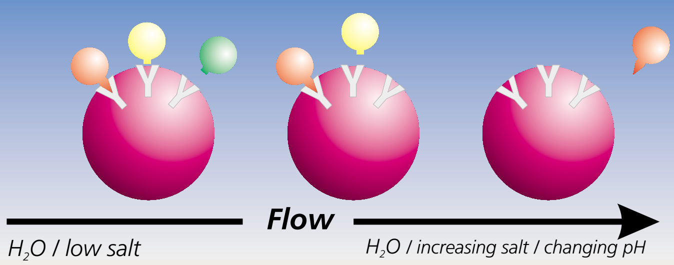
Hydrophobic Interaction Chromatography

Toyopearl Ether, Butyl, Phenyl
TSK-Gel Ether-5 PW, Phenyl-5 PW



Affinity Chromatography

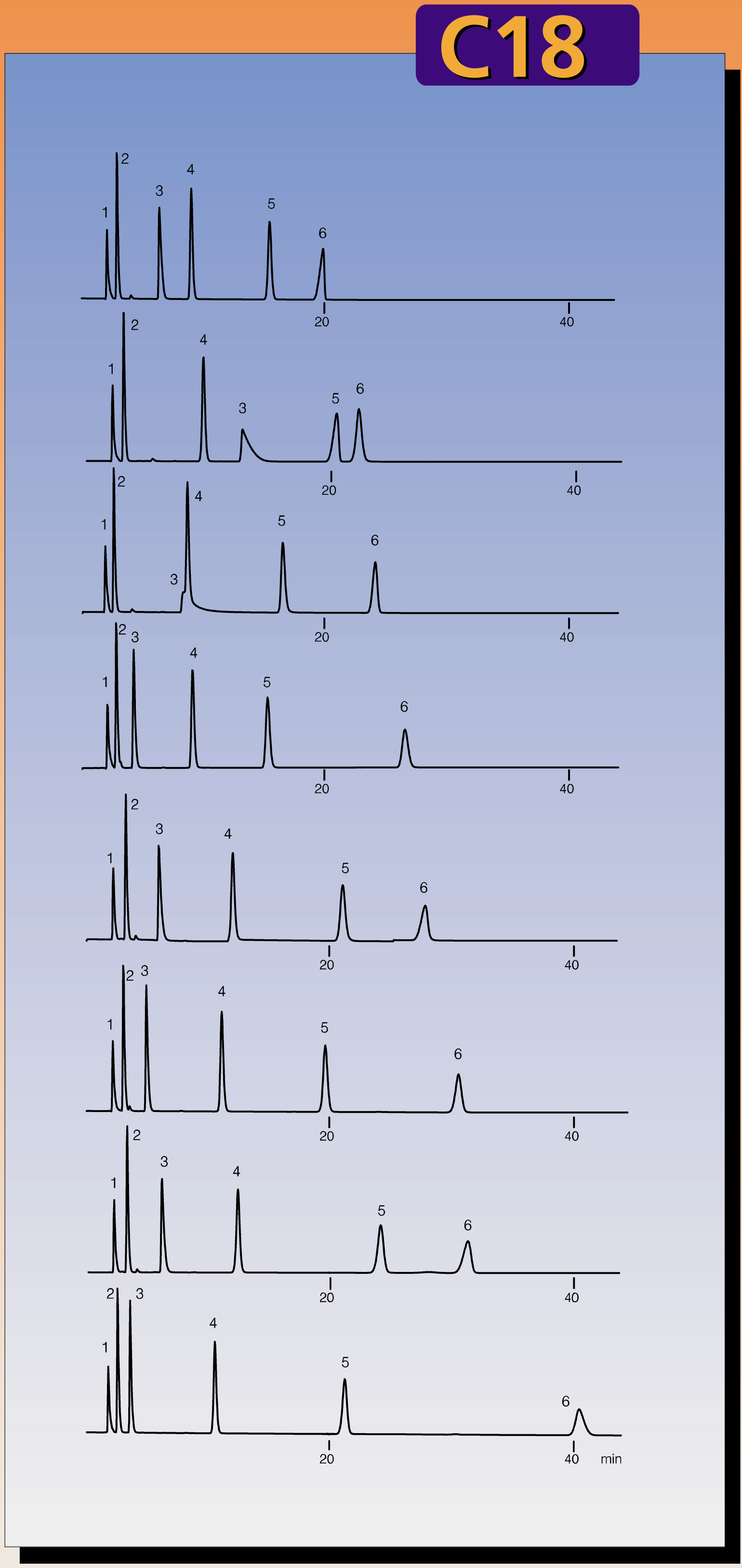
Novarose Act
Novarose IDA, TREN, DPA



Comparison of the selectivity of

Laboratory experiments demonstrate time and again the wide disparity in retention behavior of superficially comparable ODS-silica phases and the same is true also for other coatings. Thus, in order to provide as wide a palette of selectivities as possible to enable the solution of even the most complex ....

C18



GROM-SIL 100 ODS-0 AB

High-quality phase with special endcapping for the outstanding separation of acids and bases.

GROM-SIL 100 ODS-1 PE

Economical phase with partial endcapping and high selectivity.

GROM-SIL 100 ODS-2 FE

Fully endcapped stationary phase with outstanding selectivity for most applications.

GROM-SIL 120 ODS-3 CP

Encapsulated, chemically stable phase with metal-free silica gel matrix.

GROM-SIL 120 ODS-4 HE

High resolution - a new hydrophylic end-capping makes this phase especially suitable for peptides.

GROM-SIL 120 ODS-5 ST

Standard phase for practically all applications.

GROM-SIL 120 ODS-6 NE

ODS phase for special applications. High hydrophobicity despite the absence of endcapping.

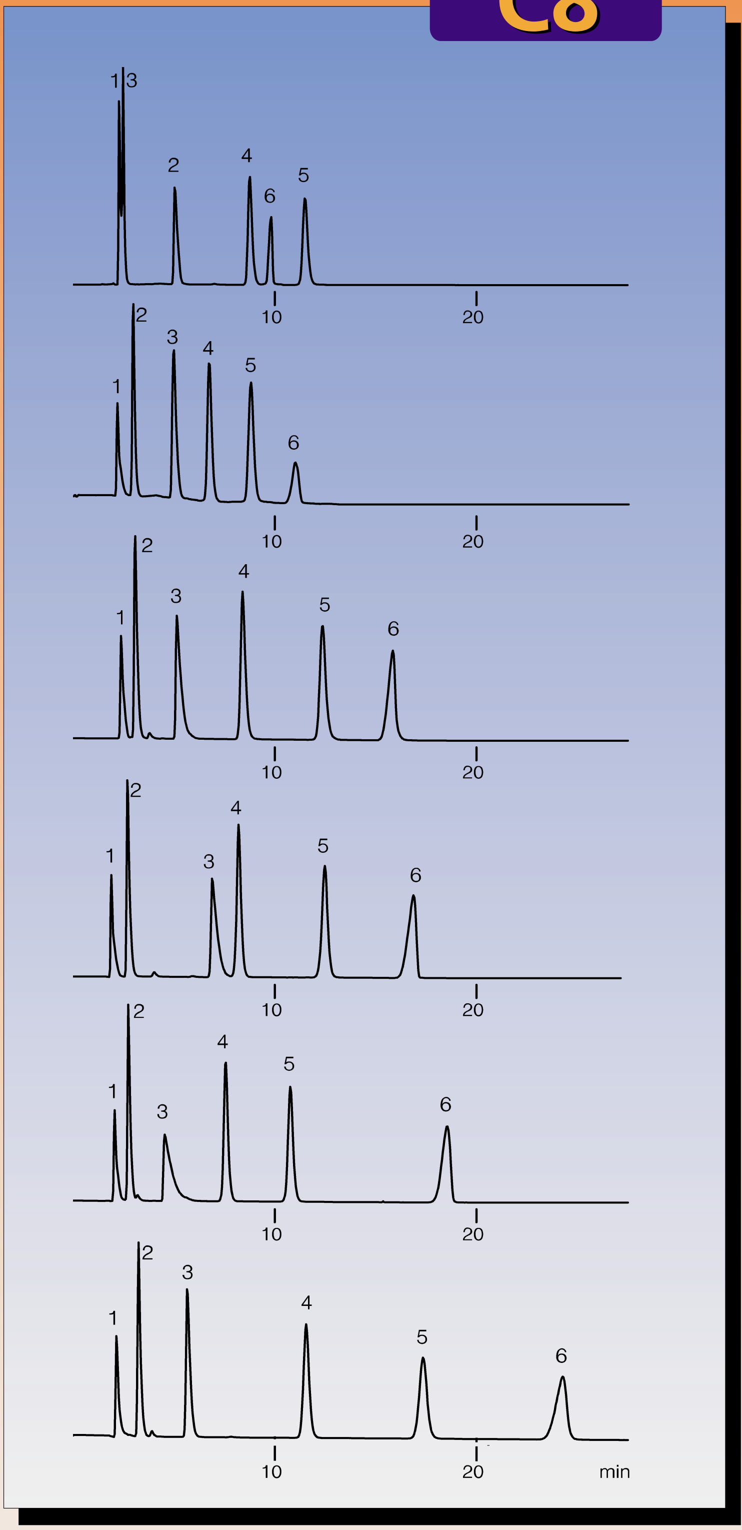
GROM-SIL 80 ODS-7 pH

Polymer-coated, pH-stable phase with extremely high carbon-content.

GROM SIL C18- and C8-phases

the most complex analytical problems by HPLC, eight different ***GROM*** SIL ODS-phases and six different ***GROM*** SIL octyl phases have been developed. Chromatograms of a test mixture (modified test of T. Daldrup and B. Kardel, Chromatographia 18, 81-83, 1984) run under identical conditions demonstrate the different hydrophobicity, and thus the selectivity, of the various differently prepared stationary phases. This is exemplified by the differing retention times of toluene and in particular of the basic components.

C8



GROM-SIL 100 Octyl-1 B

Base-deactivated phase with enhanced selectivity.

GROM-SIL 100 Octyl-2 AB

Acid- and base-deactivated phase specially suitable for the separation of acids and bases.

GROM-SIL 120 Octyl-3 BA

Tailor-made for the separation of basic molecules, monomeric bonding of alkyl silanes with differing chain lengths.

GROM-SIL 120 Octyl-4 FE

Fully endcapped octyl phase, "monomer-ically bound" and thus highly versatile.

GROM-SIL 120 Octyl-5 CP

Octyl-phase on silicone-encapsulated particles, particularly long lived.

GROM-SIL 120 Octyl-6 MB

Densely coated C8 phase, endcapped, for acidic and basic compounds.

Test chromatograms: "extended Daldrup test"

Column: NovoGrom 250 mm x 4.0 mm id.
Flow rate: 1.0 ml/min
Eluent: Na-phosphate buffer, 50 mM, pH 2.3 / acetonitrile = 58 /42 + 420 ml acetonitrile
Detection (UV): 230 nm

Compounds injected:

1) uracil
2) 4-hydroxybenzoic acid
3) diphenylhydramine
4) 5-(p-methylphenyl)-5-phenylhydantoin
5) diazepam
6) toluene

Overview of *GROM* SIL phases

	Stationary Phase	Particle Size µm 1.5	2	3	4	5	7	10	prep. material	spherical	endcapped	polymeric bonding	Pore Diameter Å
C18	GROM-SIL ... ODS-0 AB (acid/base deactivated)	x		x		x		x		x	x		100
	GROM-SIL ... ODS-1 PE (partially endcapped)			x		x		x		x	x		80, 100
	GROM-SIL ... ODS-2 FE (fully endcapped)	x		x		x		x		x	x		80, 100, 300
	GROM-SIL ... ODS-3 CP (encapsulated)			x		x	x	x	x	x		x	120, 300
	GROM-SIL ... ODS-4 HE (hydrophilic endcapping)			x	x	x	x	x	x	x	x		120, 200
	GROM-SIL ... ODS-5 ST (standard)			x	x	x	x	x	x	x	x		60, 120, 200, 300
	GROM-SIL ... ODS-6 NE (non endcapped)			x		x							120
	GROM-SIL ... ODS-7 pH (pH-stable)				x							x	80
	GROM Sapphire C18			x		x		x	x	x	x		65, 110
	GROM Ruby C18		x							x	x	x	110
C8	GROM-SIL ... Octyl-1 B (base deactivated)			x		x				x	x		100
	GROM-SIL ... Octyl-2 AB (acid/base deactivated)			x		x				x	x		100
	GROM-SIL ... Octyl-3 BA (for bases)			x		x				x	x		120
	GROM-SIL ... Octyl-4 FE (fully endcapped)			x		x		x	x	x	x		80, 100, 300
	GROM-SIL ... Octyl-5 CP (encapsulated)			x		x	x	x	x	x		x	120, 300
	GROM-SIL ... Octyl-6 MB (monomer binding)			x		x		x	x	x	x		120, 200, 300
	GROM Sapphire C8			x		x		x	x	x	x		65, 110
	GROM Ruby C8		x							x	x	x	110
C6	GROM-SIL ... Hexyl-1 MB (monomeric bonding)					x			x	x	x		80, 100
	GROM-SIL ... Phenyl-1 FE (fully endcapped)			x		x		x	x	x	x		120, 300
	GROM-SIL ... Phenyl-2 CP (encapsulated)					x						x	120, 300
	GROM-SIL ... Phenyl-3 PE (partially endcapped)			x		x		x	x	x	x		80, 100
C4	GROM-SIL ... Butyl-1 ST (standard)			x		x			x	x			120, 300
	GROM-SIL ... Butyl-2 FE (fully endcapped)			x		x			x	x			300
	GROM Sapphire C4			x		x		x	x	x	x		65, 110
C1	GROM-SIL ... TMS-1 ST (standard)			x		x			x	x	x		120, 300
	GROM-SIL ... TMS-2 CP (encapsulated)			x		x			x	x		x	120, 300
CN	GROM-SIL ...Cyan-1 ST (standard)			x		x				x	x		120, 300
	GROM-SIL ...Cyan-2 PR (cyanopropyl)			x		x				x	x		80, 100
	GROM-SIL ...Cyan-3 CP (encapsulated)					x				x		x	120
NH_2	GROM-SIL ...Amino-1 PR (NH_2-propyl)			x		x		x		x	x		80, 100
	GROM-SIL ...Amino-2 PA (cross linked Poly- NH_2)					x				x		x	120
	GROM-SIL ...Amino-3 CP (encapsulated NH_2-residues)					x			x		x		80
	GROM-SIL ...Amino-4 PR (propylamine bonded to silica)			x			x		x				300
Diol	GROM-SIL ...Diol					x		x	x	x			60, 120, 200, 300
Si	GROM-SIL ...Normal Phase-1 ST (standard silica)			x		x		x	x	x			80, 100, ... 1000
	GROM-SIL ...Normal Phase-2 SP (spherical silica)			x		x		x	x	x			60, 120, 200,...1000
	GROM-SIL ...Normal Phase-3 PV (polyvinylalcohol)					x				x		x	120
	GROM-Sapphire			x		x		x	x	x			65, 110
IEX	GROM-SIL ...SEC (size exclusion chromatography)					x		x	x	x			60, 120, 200, 300
	GROM-SIL ...StrongAnion-1,					x		x		x			80, 100
	GROM-SIL ...Weak Anion-2(ion exchange)						x			x			300
	GROM-SIL ...StrongCation-1 (ion exchange)					x		x		x			80, 100
	GROM-SIL ...Weak Cation-2(ion exchange)						x			x			300
	GROM-SIL ...HIC (hydrophobic interaction chrom.)						x			x			300

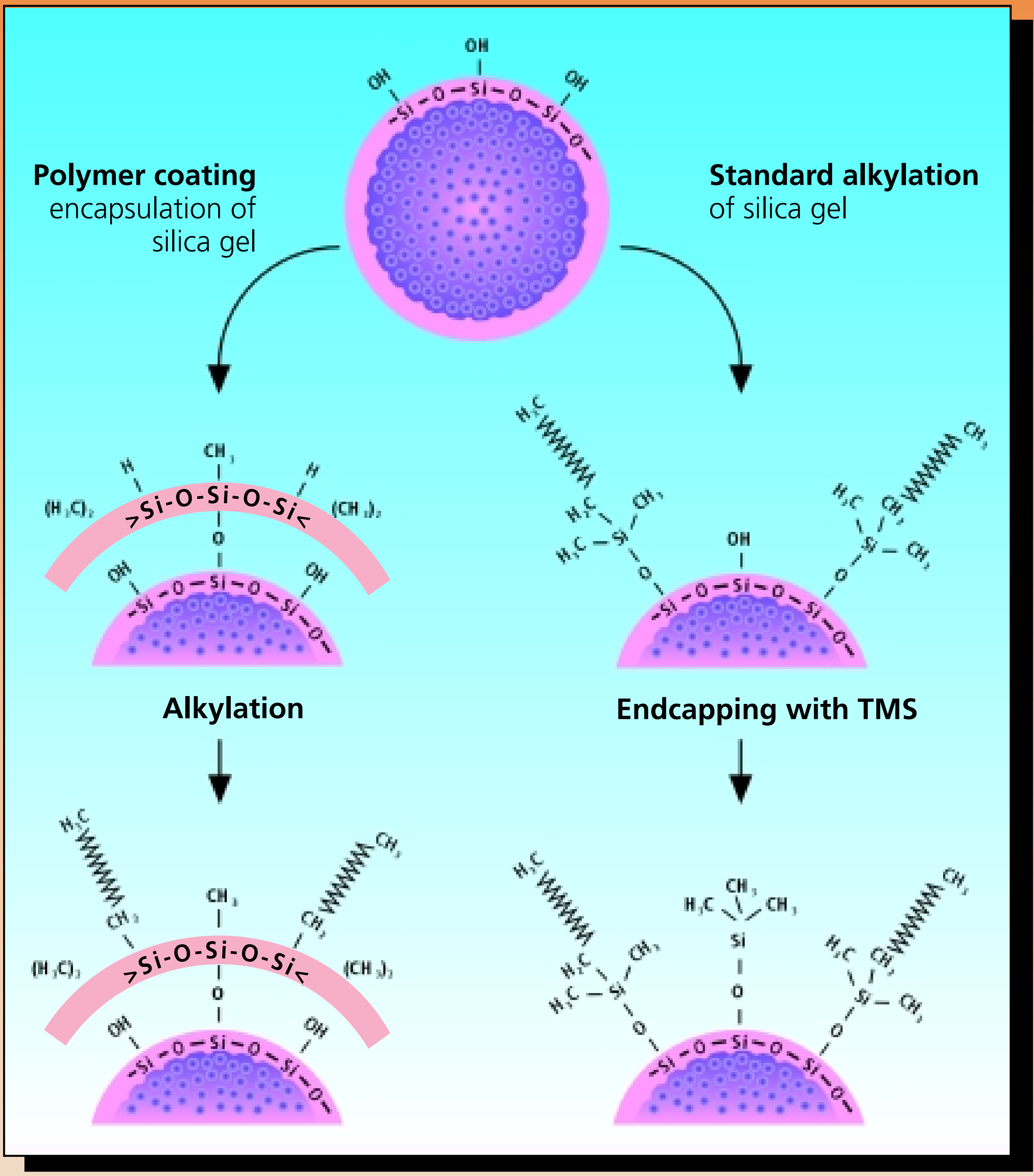
Chiral Stationary Phases for Pharmacology, Medicine and

Surface Area m^2/g	Pore Volumne ml/g	% C	Recommended pH of Mobile Phase	Field of Applications	Abbreviation for the order number
200	0.5	11	2 - 8	fat-soluble Vitamins, ...	GS OD 0......
220, 200	0.5, 0.5	7, 6	2 - 8	Drugs: Antibiotics, Anti-	GS OD 1......
220, 200, 100	0.5, 0.78, 1	12, 11, 6	2 - 8	histamines, Barbiturates	GS OD 2......
320, 170	0.8, 0.7	15, 6	1 - 10	etc. ... , Herbicides, Fungi-	GS OD 3......
300, 200	1.0, 0.95	16, 11	2 - 8	cides, Bacteriocides,	GS OD 4......
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7	22, 17,12, 7	2 - 8	Pesticides ..., Nucleotides,	GS OD 5......
300	1.0	17	2 - 8	Catecholamines, ...	GS OD 6......
510	1.0	22	1 - 10	Peptides, Proteins, ...	GS OD 7......
500, 270	0.9, 1.1	23, 16	1.5 - 9		GS OD S......
130	0.3	11	1.5 - 9		GS OD R......
200	0.5	6.5	2 - 8	Peptides,Proteins, Nucleo-	GS OC 1......
200	0.5	5	2 - 8	tides, basic compounds,	GS OC 2......
300	1.0	9	2 - 8	(Amines, etc.), Fatty acids	GS OC 3......
220, 200, 100	0.5, 0.5, 0.78	6.6, 6, 3	2 - 8	(phenacyl derivatives),	GS OC 4......
320, 170	0.8, 0.7	10, 5.5	1 - 10	Angiotensins, drugs ..... ,	GS OC 5......
300, 200, 150	1, 0.95, 0.7	10, 7, 4	2 - 8	Antihistamines, ...	GS OC 6......
500, 270	0.9, 1.1	15, 10	1.5 - 9		GS OC S......
130	0.3	7	1.5 - 9		GS OC R......
220, 200	0.5, 0.5	4, 4	2 - 8	Vitamins, Bile acids, ...	GS HE 1......
				Polyphenols, ...	
300, 150	1.0, 0.7	9, 5	2 - 8		GS PH 1......
320, 170	0.8, 0.7	7, 4	1.5 - 9		GS PH 2......
220, 200	0.5, 0.5	6.6, 6	2 - 8		GS PH 3......
300, 150	1.0, 0.7	7, 2.5	2 - 8	Proteins, Catechins, ...	GS BU 1......
100	1.0	1,5	2 - 8	Vitamins, ...	GS BU 2......
500, 270	0.9, 0.9	10.5, 7	1.5 - 9		GS BU S......
300, 150	1.0, 0.7	4	2 - 8	SFC, H_2O-sol. Vitamins, ...	GS TM 1......
320, 170	0.8, 0.7	3	1.5 - 8	Analgesics, ... Phenols, ...	GS TM 2......
300, 150	1.0, 0.7	4.8	2 - 8	Steroids, Antidepressives,	GS CN 1......
220, 200	0.5, 0.5	3.5	2 - 8	Polyphenols, Alkaloids,	GS CN 2......
320	0.8	4	1,5 - 8	SFC, ...	GS CN 3......
220, 200	0,5	2	2 - 8	Mono-,Oligosacharides,	GS NH 1......
300	1.0		2 - 8	(Analysis of beverages),	GS NH 2......
420	1.1		1.5 - 9	H_2O-soluble Vitamins,	GS NH 3......
100	0.78		2 - 8	Additives, Steroids, ...	GS NH 4......
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7		2 - 8		GS OH 1......
220, 200, ...	0.5, 0.5, ..., 1.25		2 - 8	Vitamins, Cortisone,	GS NP 1......
580, 300, 200, ...	1.1, 1.0, 0.95, ...		2 - 8	SFC ...., Drugs,	GS NP 2......
300	1.0		2 - 8	Lipids, Steroids, Purines,	GS NP 3......
				Aflatoxins,	
500, 270	0.9, 1.1		2 - 8	tricyclic Antidepressives,	GS NP S......
580, 300, 200, 150	1.1, 1.0, 0.95, 0.7		2 - 8	Peptides, Glycoproteins,	GS SE 1......
220, 200	0.5, 0.5		2 - 8	Nucleosides, Nucleotides,	GS SA 1......
100	0.7		2 - 8	Nucleic acids (DNAs,	GS WA 1......
220, 200	0.5, 0.5		2 - 8	RNAs), Polysaccharides, etc. ,	GS SC 1......
100	0.7		2 - 8		GS WC 1......
100	0.7		2 - 8		GS HI 1......

HYDROPHOBICITY

Biochemistry see pages 69 to 82 and 151

Alkylation of *GROM*-SIL reversed phases



In addition to the standard alkylation techniques, silica gels for reversed phase HPLC may be prepared by the more recently developed, alternative method of "polymer encapsulation". Here, *GROM*-SIL particles are coated with a reactive polymeric silicone film which binds chemically to the surface of the silica gel. This chemically bound film is then alkylated. The spherical encapsulated silica particles possess the same mechanical strength as non-coated particles. In the case of the polymer encapsulated phases, the alkyl moieties are bound to silicon atoms in the polymer film rather than directly via Si-O-Si alkyl bonding to the silica surface. This leads to a considerable increase in chemical stability.