USP listing

USP listing of MN GC phases

Code	Specifications	MN GC phases	Page
USP G1 / G2	dimethylpolysiloxane oil	OPTIMA® 1	310
		OPTIMA® 1 MS	312
		OPTIMA® 1 MS Accent	312
		OPTIMA® 1-TG	348
		PERMABOND® SE-30	336
		PERMABOND® P-100	352
USP G3	50 % phenyl - 50 % methylpolysiloxane	OPTIMA® 17	327
		OPTIMA® 17 MS	328
		OPTIMA® 17-TG	348
USP G6	trifluoropropylmethylpolysiloxane	OPTIMA® 210	329
USP G7	50 % 3-cyanopropyl - 50 % phenylmethylpolysiloxane	OPTIMA® 225	330
USP G16	polyethylene glycol (average molecular weight ~ 15 000); high molecular weight compound of polyethylene glycol and diepoxide	OPTIMA® WAX	332
		OPTIMA WAXplus®	333
		PERMABOND® CW 20 M	337
		PERMABOND® CW 20 M-DEG	354
		FS-CW 20 M-AM	351
USP G19	25 % phenyl – 25 % cyanopropyl – 50 % methylsiloxane	OPTIMA® 225	330
USP G25	high molecular weight compound of polyethylene glycol and diepoxide, which is esterified with terephthalic acid	OPTIMA® FFAP	334
		OPTIMA® FFAPplus	335
		PERMABOND® FFAP	338
USP G27	5 % phenyl – 95 % methylpolysiloxane	OPTIMA® 5	314
		OPTIMA® 5 Amine	350
		OPTIMA® 5 HT	349
		OPTIMA® 5 MS	315
		OPTIMA® 5 MS Accent	316
		PERMABOND® SE-52	336
USP G28	25 % phenyl – 75 % methylpolysiloxane	OPTIMA® 35 MS	326
USP G32	20 % phenylmethyl – 80 % dimethylpolysiloxane	OPTIMA® 35 MS	326
USP G35	high molecular weight compound of polyethylene glycol and diepoxide, which is esterified with nitroterephthalic acid	OPTIMA® FFAP	334
		OPTIMA® FFAPplus	335
		PERMABOND® FFAP	338
USP G36	1 % vinyl – 5 % phenylmethylpolysiloxane	OPTIMA® 5	314
		OPTIMA® 5 Amine	350
		OPTIMA® 5 HT	349
		OPTIMA® 5 MS	315
		OPTIMA® 5 MS Accent	316
		PERMABOND® SE-54 HKW	352
USP G38	dimethylpolysiloxane oil	OPTIMA® 1	310
		OPTIMA® 1 MS	312
		OPTIMA® 1 MS Accent	312
		OPTIMA® 1-TG	348
		PERMABOND® SE-30	336
		PERMABOND® P-100	352
USP G42	35 % phenyl – 65 % dimethylpolysiloxane	OPTIMA® 35 MS	326
USP G43	6 % cyanopropylphenyl – 94 % dimethylpolysiloxane	OPTIMA® 1301	321
		OPTIMA® 1301 MS	322
		OPTIMA® 624	323
		OPTIMA® 624 LB	323
USP G46	14 % cyanopropylphenyl – 86 % methylpolysiloxane	OPTIMA® 1701	324
		OPTIMA® 1701 MS	325
USP G49	proprietary derivatized phenyl groups on a polysiloxane backbone	OPTIMA® δ-3	319

Summary of MN phases for GC

Overview of OPTIMA® MN phases

Phase	Composition	Page	Relative polarity ①	Maximum temperature ②
OPTIMA® 1	100 % dimethylpolysiloxane	310		
OPTIMA® 1 MS		312		340 / 360 °C
OPTIMA® 1 MS Accent		312		
OPTIMA® 5	5 % phenyl – 95 % methylpolysiloxane	314		340 / 360 °C
OPTIMA® 5 MS	5 % diphenyl – 95 % dimethylpolysiloxane	315		340 / 360 °C
OPTIMA® 5 MS Accent	silarylene phase with selectivity similar to 5 % diphenyl – 95 % dimethylpolysiloxane	316		340 / 360 °C
OPTIMA® XLB	silarylene phase like above, optimized silarylene content for low bleeding	317		340 / 360 °C
OPTIMA® δ-3	phase with autoselectivity ④	319		340 / 360 °C
OPTIMA® δ-6	phase with autoselectivity ④	320		340 / 360 °C
OPTIMA® 1301	6 % cyanopropylphenyl – 94 % dimethylpolysiloxane	321		300 / 320 °C
OPTIMA® 1301 MS	silarylene phase with low bleeding: polarity similar to 6 % cyanopropylphenyl – 94 % dimethylpolysiloxane	322		300 / 320 °C
OPTIMA® 624	6 % cyanopropylphenyl – 94 % dimethylpolysiloxane	323		280 / 300 °C
OPTIMA® 624 LB	like above, phase with low bleeding	323		
OPTIMA® 1701	14 % cyanopropylphenyl – 86 % dimethylpolysiloxane	324		280 / 300 °C
OPTIMA® 1701 MS	silarylene phase with low bleeding: polarity similar to 14 % cyanopropylphenyl – 86 % dimethylpolysiloxane	325		280 / 300 °C

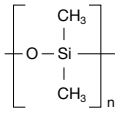
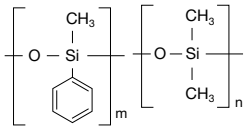
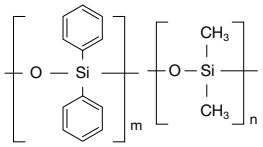
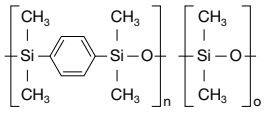
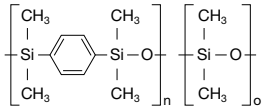
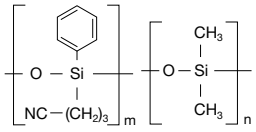
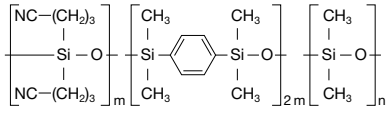
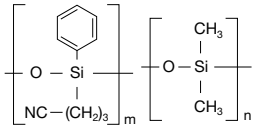
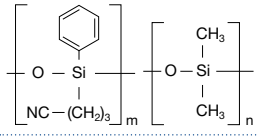
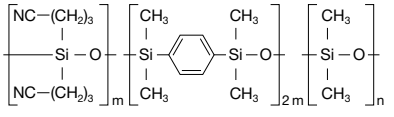
① = nonpolar, = polar

② First temperature (long term temperature) for isothermal operation, second value for the max. temperature (short term temperature) in a temperature program. Please note th
For details refer to the description of individual phases.

③ Phases which provide a similar selectivity based on chemical and physical properties

④ See description on page 318

GC columns for special separations can be found from page 339 onwards.

Structure	USP	Similar phases ③
	G1 / G2 / G38	PERMABOND® SE-30, OV-1, DB-1, SE-30, HP-1, SPB™-1, CP-Sil 5 CB, Rtx®-1, 007-1, BP1, MDN-1, AT™-1, ZB-1, OV-101
		5 % diphenyl – 95 % dimethylpolysiloxane
	G27 / G36	PERMABOND® SE-52, SE-54, SE-52, HP-5, SPB™-5, CP-Sil 8, Rtx®-5, 007-5, BP5, MDN-5, AT™-5, ZB-5
	G27 / G36	DB-5, DB-5MS, HP-5MS, Ultra-2, Equity™-5, CP-Sil 8CB low bleed/MS, Rxi®-5MS, Rtx®-5SIL-MS, Rtx®-5MS, 007-5MS, BPX™5, MDN-5S, AT™-5MS, VF-5MS
	G27 / G36	
	–	DB-XLB, Rxi®-XLB, Rtx®-XLB, MDN-12, VF-XMS
see description page 318	G49	no similar phases
see description page 318	–	no similar phases
	G43	HP-1301, DB-1301, SPB™-1301, Rtx®-1301, CP-1301, 007-1301
	G43	VF-1301ms, Rxi®-1301Sil MS, TG-1301MS
	G43	HP-624, HP-VOC, DB-624, DB-VRX, SPB™-624, CP-624, Rtx®-624, Rtx®-Volatiles, 007-624, BP624, VOCOL
	G46	OV-1701, DB-1701, CP-Sil 19 CB, HP-1701, Rtx®-1701, SPB™-1701, 007-1701, BP10, ZB-1701
	G46	VF-1701ms, TG-1701MS, OV-1701, DB-1701, HP-1701, Rtx®-1701, SPB™-1701, CP Sil 19 CB, 007-1701, BP10, ZB-1701

at for columns with 0.53 mm ID and for columns with thicker films temperature limits are generally lower.

Summary of MN phases for GC

Phase	Composition	Page	Relative polarity ①	Maximum temperature ②
OPTIMA® 35 MS	silarylene phase with selectivity similar to 35 % diphenyl – 65 % dimethylpolysiloxane	326		360 / 370 °C
OPTIMA® 17	phenylmethylpolysiloxane, 50 % phenyl	327		320 / 340 °C
OPTIMA® 17 MS	silarylene phase with selectivity similar to 50 % phenyl – 50 % methylpolysiloxane	328		340 / 360 °C
OPTIMA® 210	trifluoropropylmethylpolysiloxane (50 % trifluoropropyl)	329		260 / 280 °C
OPTIMA® 225	50 % cyanopropylmethyl – 50 % phenylmethylpolysiloxane	330		260 / 280 °C
OPTIMA® 240	33 % cyanopropylmethyl – 67 % dimethylpolysiloxan	331		260 / 280 °C
OPTIMA® WAX	polyethylene glycol 20 000 Da	332		240 / 250 °C
OPTIMA WAXplus®	polyethylene glycol with optimized cross-linking	333		260 / 270 °C
OPTIMA® FFAP	polyethylene glycol 2-nitroterephthalate	334		250 / 260 °C
OPTIMA® FFAPplus	polyethylene glycol 2-nitroterephthalate with optimized cross-linking	335		250 / 260 °C

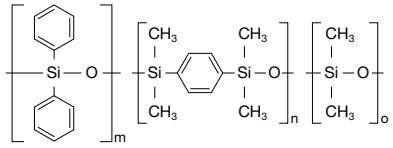
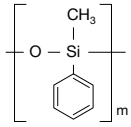
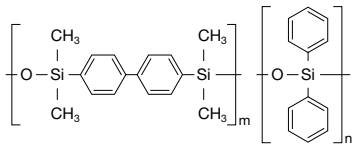
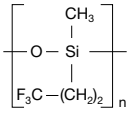
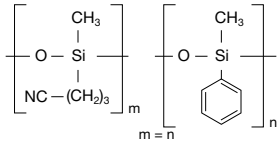
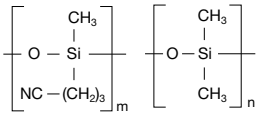
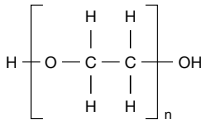
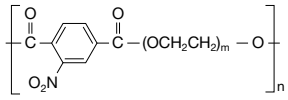
① = nonpolar, = polar

② First temperature (long term temperature) for isothermal operation, second value for the max. temperature (short term temperature) in a temperature program. Please note t
For details refer to the description of individual phases.

③ Phases which provide a similar selectivity based on chemical and physical properties

GC columns for special separations can be found from page 339 onwards.

Summary of MN phases for GC

Structure	USP	Similar phases ③
	G28 / G32 / G42	DB-35 MS, HP-35, SPB™-35, Rxi®-35SIL MS, Rtx-35, 007-35, BPX™-35, MDN-35, AT™-35 MS, ZB-35, OV-11, VF-35 MS
	G3	OV-17, DB-17, HP-50+, HP-17, SPB™-50, SP-2250, Rxi®-17, Rtx®-50, CP-Sil 24 CB, 007-17, ZB-50
	G3	OV-17, AT™-50, BPX™-50, DB-17, DB-17ms, HP-50+, HP-17, SPB™-50, SPB™-17, SP-2250, Rtx®-50, CP-Sil 24 CB, 007-17, VF-17ms, ZB-50
	G6	OV-210, DB-210, Rtx®-200, 007-210
	G7 / G19	DB-225, HP-225, OV-225, Rtx®-225, CP-Sil 43, 007-225, BP225
	–	no similar phases
	G16	PERMABOND® CW 20 M, DB-Wax, Supelcowax, HP-Wax, HP-INNOWAX, Rtx-Wax, CP-Wax 52 CB, Stabilwax, 007-CW, BP20, AT-Wax, ZB-Wax DB-Wax, Supelcowax, HP-Wax, HP-INNOWAX, Rtx-Wax, CP-Wax 52 CB, Stabilwax, 007-CW, BP20, AT-Wax, ZB-Wax
	G35 / G25	PERMABOND® FFAP, DB-FFAP, HP-FFAP, CP-Wax 58 FFAP CB, 007-FFAP, CP-FFAP CB, Nukol™, AT-1000, SPB-1000, BP21, OV-351 DB-FFAP, HP-FFAP, CP-SIL 58 CB, 007-FFAP, CP-FFAP CB, Nukol™

hat for columns with 0.53 mm ID and for columns with thicker films temperature limits are generally lower.