



Summary of MN phases for GC



Overview of OPTIMA® MN phases

| Phase | Composition | Page | Relative polarity ^① | Maximum temperature ^② |
|---------------------|--|------|--------------------------------|----------------------------------|
| OPTIMA® 1 | | 310 | | |
| OPTIMA® 1 MS | 100 % dimethylpolysiloxane | 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® 5-3 | phase with autoselectivity ^④ | 319 | | 340 / 360 °C |
| OPTIMA® 5-6 | 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 | | |
| OPTIMA® 624 LB | like above, phase with low bleeding | 323 | | 280 / 300 °C |
| 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 that 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 |
|---|-----------|--|
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | 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 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | 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 |
| $\left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{O}-\text{Si} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | 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 |
| $\left[\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{Si} \text{---} \text{C}_6\text{H}_4 \text{---} \text{Si} \text{---} \text{O} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_n \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{CH}_3 \end{array} \right]_o$ | G27/G36 | |
| $\left[\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{Si} \text{---} \text{C}_6\text{H}_4 \text{---} \text{Si} \text{---} \text{O} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_n \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{CH}_3 \end{array} \right]_o$ | – | 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 |
| $\left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{O}-\text{Si} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | G43 | HP-1301, DB-1301, SPB™-1301, Rtx®-1301, CP-1301, 007-1301 |
| $\left[\begin{array}{c} \text{NC}-(\text{CH}_2)_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{Si} \text{---} \text{C}_6\text{H}_4 \text{---} \text{Si} \text{---} \text{O} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_{2m} \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{CH}_3 \end{array} \right]_n$ | G43 | VF-1301ms, Rxi®-1301Sil MS, TG-1301MS |
| $\left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{O}-\text{Si} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | G43 | HP-624, HP-VOC, DB-624, DB-VRX, SPB™-624, CP-624, Rtx®-624, Rtx®-Volatiles, 007-624, BP624, VOCOL |
| $\left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{O}-\text{Si} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | G46 | OV-1701, DB-1701, CP-Sil 19 CB, HP-1701, Rtx®-1701, SPB™-1701, 007-1701, BP10, ZB-1701 |
| $\left[\begin{array}{c} \text{NC}-(\text{CH}_2)_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{Si} \text{---} \text{C}_6\text{H}_4 \text{---} \text{Si} \text{---} \text{O} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_{2m} \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si} \text{---} \text{O} \\ \\ \text{CH}_3 \end{array} \right]_n$ | G46 | VF-1701ms, TG-1701MS, OV-1701, DB-1701, HP-1701, Rtx®-1701, SPB™-1701, CP Sil 19 CB, 007-1701, BP10, ZB-1701 |

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



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| 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 % dimethylpolysiloxane | 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 that 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 [®] |
|--|-----------------|--|
| $\left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{Si}-\text{O} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si}-\text{C}_6\text{H}_4-\text{Si} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_n \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{Si}-\text{O} \\ \\ \text{CH}_3 \end{array} \right]_o$ | 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 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_m$ | 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 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si}-\text{C}_6\text{H}_4-\text{C}_6\text{H}_4-\text{Si} \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array} \right]_m \left[\begin{array}{c} \text{C}_6\text{H}_5 \\ \\ \text{O}-\text{Si} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_n$ | 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 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{F}_3\text{C}-(\text{CH}_2)_2 \end{array} \right]_n$ | G6 | OV-210, DB-210, Rtx [®] -200, 007-210 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{C}_6\text{H}_5 \end{array} \right]_n$ <p style="text-align: center;">$m = n$</p> | G7 / G19 | DB-225, HP-225, OV-225, Rtx [®] -225, CP-Sil 43, 007-225, BP225 |
| $\left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{NC}-(\text{CH}_2)_3 \end{array} \right]_m \left[\begin{array}{c} \text{CH}_3 \\ \\ \text{O}-\text{Si} \\ \\ \text{CH}_3 \end{array} \right]_n$ | - | no similar phases |
| $\text{H} \left[\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{O}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array} \right]_n$ | 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 |
| $\left[\begin{array}{c} \text{O} \\ \\ \text{C}-\text{C}_6\text{H}_3(\text{NO}_2)-\text{C} \\ \quad \\ \text{O} \quad \text{O}-(\text{OCH}_2\text{CH}_2)_m-\text{O} \end{array} \right]_n$ | 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.