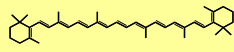


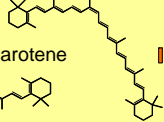
k All trans beta-carotene



Hydrophobicity (bubble size)

Carbon content

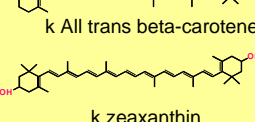
k 13-cis-beta-carotene



Steric selectivity (X axe)

Bonding fonctionnalité
Bonding density
Pore diameter

k All trans beta-carotene



Polar surface activity (Y axe)

Silica type (A,B,C)
Encapping treatments
Hydrophilic endcapping
Polar embedded groups

G4 MONOMERIC type behavior

WAKOSIL C18 RS (22) Type B
EXELSPHER 120 C18 H (21) Type B
UPTISPHERE HDO (20) Type B
YMC-PACK ODS-AQ (19) Type B
TARGA C18 (18) Type B
ZORBAX SB C18 (17) Type B
SYNCHROPAK C18 (16) Type A
TSKgel ODS 80 TM (15) Type B
VVDAC 238 TP 300A (14) Type B
PATHFINDER EP (130) Type B
SYNERGY MAX RP (C12) (160) Type B

G9 MONOMERIC

Low bonding density
Low polar surface activity

ULTRASPHERE XL ODS (65) Type B
UPTISPHERE HSC (64) Type B
ZORBAX ECLIPSE XDB (63) Type B
SATISFACTION RP 18 AB (62) Type B
CAPELL PAK (61) Type B
YMC-PACK PRO C18 (57) Type B
ULTRASPHERE ODS 2 120 (59) Type B
CAPELL PAK (58) Type B
GENESIS C18 (54) Type B
ADSORBOSPHERE HS (55) Type A
STRATEGY C18-3 (161) Type B
HYPERASIL GOLD (126) Type B
YMC-Pack ODS-A 120 (144) Type A
YMC-Pack ODS-A 200 (145) Type A
SUNFIRE C18 (154) Type B

DELTA-PAK C18 (53) Type B
LUNA C18-2 (52) Type B
UPTISPHERE ODB (51) Type B
APEX C18 (46) Type A
HYPERASIL ODS (48) Type A
SUPELCOSIL LC-18S (50) Type A
CLPEUS C18 (47) Type B
HYPERASIL 100 C18 (49) Type A
INERTSIL ODS 3 (43) Type B
XTERRA MS C18 (42) Hybrid silica
HABISIL C18 (41) Type B
PE 6x15 CR C18 (40) Type B
PURSUIT C18 (119) Type B
GEMINI C18 (127) Hybrid silica
PURSUIT XRs (135) Type B
PRODIGY ODS2 (136) Type B
PRODIGY ODS 3 (137) Type B
ZORBAX ECLIPSE PLUS (138) Type B
GEMINI NX (156) Hybrid silica
X BRIDGE C18 (155) Hybrid silica
TSKgel ODS 100V (148) Type B

G11 MONOMERIC

High bonding density
Low polar surface activity.

OMNISPHERE C18 (102) Type B
ZORBAX EXTEND (101) Bidentate
KROMASIL C18 (100) Type B
RESTEK ULTRA C18 (99) Type B
Halsil HL C18 (98) Type B
NUCLEOSIL 100-5C18 HD (97) Type A
ACCLAIM C18 (115) Type B
HYPERASIL ELITE (96) Type A
INERTSIL ODS 2 (95) Type B
SUPERSPHER 100 RP18 e (94) Type B
SUPELCOSIL LC-18 T (83) Type A
SYMMETRY C18 (87) Type B
NUCLEODUR GRAVITY C18 (118) Type A
HYPERASIL BDS (90) Type A
LICHROSFER 100 RP18 e (88) Type A
ZORBAX RX-C18 (89) Type B

DISCOVER C18 (91) Type B
HYPERASIL HyPURITY (92) Type B
BETABASIC (113) Type B
PUROSPHER 100 RP18 e (86) Type B
ALLTIMA C18 (85) Type B
PUROSPHER star RP18 e (114) Type B
ASCENTIS C18 (134) Type B
STRATEGY C18-2 (132) Type B
SUPELCOSIL LC-18 (44) Type A
DEVELOSEL C18 (45) Type A
SUPELCOSIL LC-18 DB (66) Type A
ALLTIMA HP C18 HL (124) Type B
PE CR C18 (40) Type B
ALLTIMA C18 HP (125) Type B
ACE C18 (128) Type B
J'SPHERE 80H (143) Type A
YMC-Pack ODS-A 300 (146) Type A
ACE C18 HL (152) Type B
ASCENTIS EXPRESS C18 (161) Fused core

G7 POLYMERIC

Low polar surface activity

NUCLEOSIL 5 C18 AB (103) Type B
BAKER NP (110) Type B
NUCLEODUR ISIS (131) Type B
UPTISPHERE TF (116) Type B
COSMOSIL C18 AR II (122) Type B
WAKOSIL AR C18 II (157) Type B
JUPITER C18 300 (115) Type B
CHOLESTER (158) Type B

G1 VARIED SUPPORTS

Specific steric selectivity

SGE-250 GL4 C18 (2) Type B
ZORBAX 300 SB C18 (3) Type B
UNISPHERE C 18 (1) Type B
HYDROSPHERE C18 (4) Type B
GAMMABOND C18 (5) Polymer coated
ATLANTIS dC18 (120) Type B
ATLANTIS T3 (153) Trifunctional anchor
NUCLEODUR SPINX (140) Mixed phase
J'SPHERE 30L (141) Type B
J'SPHERE 80M (142) Type B
TSKgel ODS 100V (148) Type B
PI-NAPHTYL (159) Naphtalene bonded

G3 MONOMERIC Type A

C18 MICRO-BONDAPAK (13) Type A
ALPHABOND (12) Type A
RES-ELUT 5-C18 (11) Type A
LICHROSORB RP 18 (10) Type A
ECONOSPHERE (9) Type A
PARTISIL ODS3 (8) Type A

G2 MONOMERIC Type A

ZORBAX ODS (7) Type A
PARTISIL ODS1 (6) Type A

G8 MONOMERIC

Low bonding density
Medium polar surface activity

ECONOSIL (29) Type A
ADSORBOSIL (28) Type A
CHROMEGABOND C 22 (30) Type B
BONDASORB (25) Type B
UPTISPHERE NEC (27) Type B
TSKgel ODS 80 TM (15) Type B
PLATINUM C18 (24) Type B
SEPARON C18 (26) Type B
VVDAC 201 HS (23) Type B
COSMOSIL C18 PAQ (123) Type B

G5 POLYMERIC Narrow pore (100 Å)

HYPERASIL GREEN PAH (35) Type B
LICHROSFER LC-PAH (34) Type B
NUCLEOSIL 5 C18 PAH (33) Type B
SPHERISORB ODS 1 (36) Type B
HYPERASIL PAH (32) Type B
PARTISIL ODS 2 (31) Type B

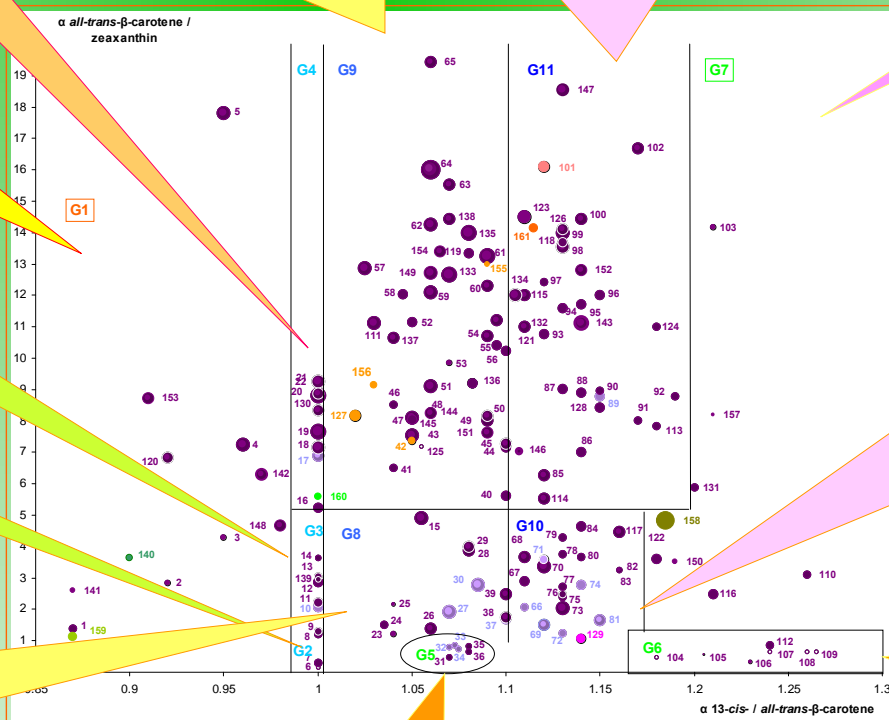
G10 MONOMERIC

High bonding density

SMT-C18 (68) horizontal polymer
SUPERSPHER 100 RP18 (71) Type B
NORMASPHERE ODS 2 (70) Type B
COLOSPHERE C18 (67) Type B
LICHROSFER 100 RP 18 (74) Type A
NUCLEOSIL 50-5 C18 ec (73) Type A
STABILITY ODS 2 (81) Type B
NUCLEOSIL 50-5 C18 (69) Type A
NOVA-PAK C18 (84) Type A
CHROMOLITH RP 18e (79) Monolith
NUCLEOSIL 100-5 C18 (37) Type A
BRAVA BDS C18 (78) Type B
SPHERI-5 ODS (80) Type B
ADSORBOSPHERE XL (82) Type A
NUCLEOSIL 300-5C18 (83) Type A
TSKgel ODS 120T (77) Type B
SPHERISORB ODS 2 (76) Type A
EXSIL ODS (75) Type A
SPHERISORB ODB (66) Type A
PUROSPHER 100 RP18 (72) Type B
NUCLEODUR 100 C18 ec (117) Type B
RESOLVE C18 (39) Type A
COAGENT C18 (129) Type C

G6 POLYMERIC 300Å

VVDAC 201 TP (109) Type B
VVDAC 218 TP (107) Type B
PROSPHERE C18 300A (106) Type B
BAKER C18 WP (110) Type B
VVDAC 202 TP (104) Type B
VVDAC 218 MR (108) Type B
TSKgel ODS 120 A (112) Type B



Numerous tests try to compare and classify the stationary phases based on alkylbonded silica. This purpose is of a main importance in HPLC, but will become also one of the main choice to be performed by chromatographer in SFC, when these chromatographers will understand that, despite the polarity of carbon dioxide, apolar stationary phases provide many opportunities to reach separation. However, the number of these phases make the choice difficult. The carotenoid test allows to check three of the main properties of the phases : 1/ hydrophobicity, which rules the analysis duration and depends on the carbon content; 2/ steric selectivity, which depends on the bonding density, the fonctionality of the bonded silane and the pore diameter; 3/ the polar surface activity, which depends on residual silanol and endcapping treatments.

This first classification of eleven groups is performed from the two selectivities. Each group include columns displaying close separation performances (retention order). In each group, hydrophobicity can vary between the columns, and can be a second base of column selection.

The polar embedded phases or the phases encapped with hydrophilic endcapping are not plotted on this graph. They are located in groups 8, 10, 5 and 6; due to their high polar surface activity.