

YMC Carotenoid

- **C30 chains**
- **very lipophilic**
- **exceptional selectivity pattern**
- **isomer recognition**
- **LC-MS applications**
- **polar carotenes**
- **polar and nonpolar xanthophylls**
- **steroids**
- **retinols**
- **fat-soluble vitamins**

Specifications	YMC Carotenoid
Particle size / μm	3; 5
Pore size / nm	proprietary
Surface area / m^2g^{-1}	proprietary
Carbon content / %	proprietary
Recommended pH range	2.0 – 7.5

General

The separation of geometric and positional isomers is a challenging task in reversed phase chromatography. Subtle molecular differences have to be recognized and resolved by this particular stationary phase. Sander et al. have con-

clusively shown that polymeric C30 HPLC stationary phases are able to discriminate isomeric structures of long chain molecules [1,2].

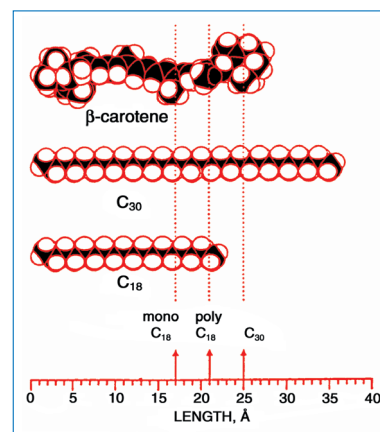
Properties

Compared to classical C18 stationary phases, YMC Carotenoid is much more hydrophobic. Even when pure organic eluents are applied, many sample solutes are retained. The use of non-aqueous reversed phase mobile phases facilitates 100% solvent recycling and LC-MS applications. The YMC Carotenoid stationary phase provides sufficient phase thickness to enhance interaction with long chained molecules (see figure on right). Therefore, geometric and positional isomers of conjugated double bonding systems are recognised and resolved by the YMC Carotenoid phase.

The resolving power of YMC Carotenoid for isomers can be verified by the separation of carotenoids, which has been subject of considerable research efforts in the past. Carotenoids are found in a variety of natural sources including fruits and vegetables. In addition, carotenoids are

considered as potential drugs for cancer intervention or prevention.

Despite the complexity of carotenoid extracts and the minor shape differences between carotenoid isomers, the separation, identification and quantification of these compounds can be achieved by using YMC Carotenoid columns.



Comparison of the film thickness of C18 and C30 stationary phases with the molecular length of β -carotene (determined with Small Angle Neutron Scattering (SANS)).

Application

YMC Carotenoid columns are successfully used in the food industry, for the analysis of vitamin formulations, in environmental analysis, and for the control of algal growth.

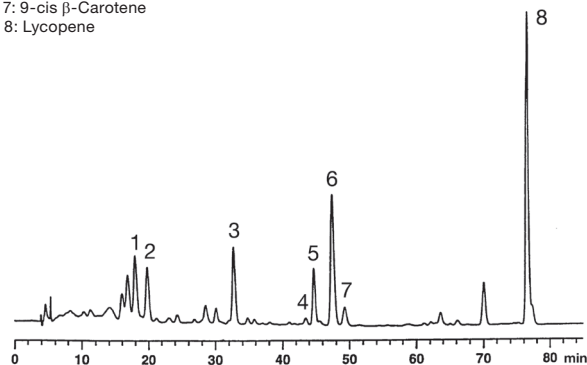
Other potential applications include the separation of prostaglandins and leucotrienes.

YMC Carotenoid

Separation of natural compounds

Extract of SRM 2383, NIST food standard^a

- 1: Lutein
- 2: Zeaxanthin
- 3: β -Cryptoxanthin
- 4: 13-cis β -Carotene
- 5: α -Carotene
- 6: trans β -Carotene
- 7: 9-cis β -Carotene
- 8: Lycopene

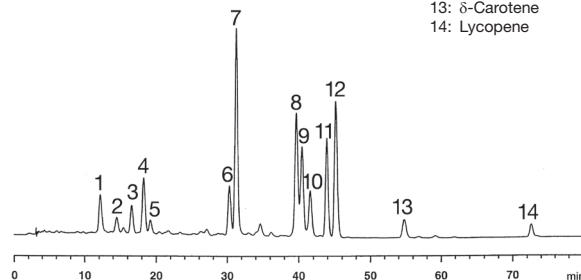


Column: YMC Carotenoid (5 μ m) 250 x 4.6 mm ID
 Part No.: CT99S05-2546WT
 Eluent: A: MeOH / MTBE / H₂O = 81/15/4 / B: MeOH / MTBE / H₂O = 6/90/4
 Gradient: 0-100% B (90 min)
 Flow: 1.0 mL/min
 Detection: UV at 450 nm
 Temperature: ambient

Carotene and Xanthophyll standard^a

Gradient elution was performed by ternary gradient elution. Mobile phase B) is not miscible in this proportion. For binary gradient elution, MeOH/MTBE/water(7/90/3) is suitable as mobile phase B).

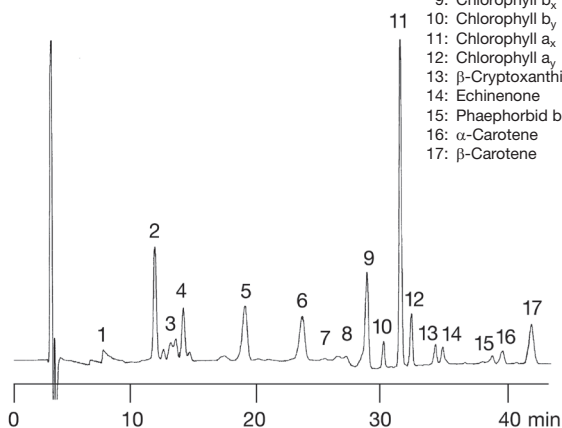
- 1: Astaxanthin
- 2: Capsanthin
- 3: Lutein
- 4: Zeaxanthin
- 5: Canthaxanthin
- 6: β -Cryptoxanthin
- 7: Echinenone
- 8: 15-cis β -Carotene
- 9: 13-cis β -Carotene
- 10: α -Carotene
- 11: trans β -Carotene
- 12: 9-cis β -Carotene
- 13: δ -Carotene
- 14: Lycopene



Column: YMC Carotenoid (5 μ m) 250 x 4.6 mm ID
 Part No.: CT99S05-2546WT
 Eluent: A: MeOH / MTBE / H₂O = 81/15/4 / B: MeOH / MTBE / H₂O = 6/90/4
 Gradient: 1-100% B (90 min)
 Flow: 1.0 mL/min
 Detection: UV at 450 nm
 Temperature: ambient

Carotenoid pigments in algae^b

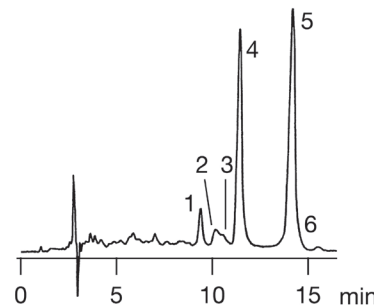
- 1: Chlorophyll c₁+c₂
- 2: Fucoxanthin
- 3: Neoxanthin
- 4: Violaxanthin
- 5: Diadinoxanthin
- 6: Lutein
- 7: Zeaxanthin
- 8: Diatoxanthin
- 9: Chlorophyll b_x
- 10: Chlorophyll b_y
- 11: Chlorophyll a_x
- 12: Chlorophyll a_y
- 13: β -Cryptoxanthin
- 14: Echinenone
- 15: Phaephorbid b
- 16: α -Carotene
- 17: β -Carotene



Column: YMC Carotenoid (5 μ m) 250 x 4.6 mm ID
 Part No.: CT99S05-2546WT
 Eluent: A: methanol / acetone = 60/40
 B: acetone / H₂O = 60/40
 Gradient: 60-30% B (0-3 min), 30% B (3-22 min), 30-10% B (22-26 min), 10% B (26-41.5 min), 10-60% B (41.5-45 min)
 Flow: 0.5 mL/min
 Detection: UV at 450 nm
 Temperature: 35 °C

Carotene isomers from commercially available capsules^a

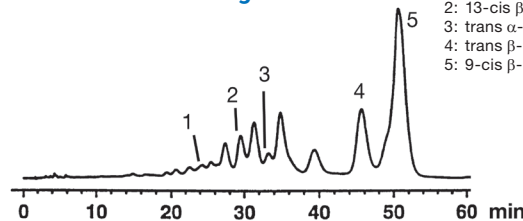
- 1: 15-cis β -Carotene
- 2: 13-cis β -Carotene
- 3: 13'-cis β -Carotene
- 4: α -Carotene
- 5: β -Carotene
- 6: α -Carotene



Column: YMC Carotenoid (5 μ m) 250 x 4.6 mm ID
 Part No.: CT99S05-2546WT
 Eluent: EtOH / MeOH / THF = 75/20/5
 Flow: 1.0 mL/min
 Detection: UV at 450 nm
 Temperature: ambient

Carotenes found in algae^a

- 1: 15-cis β -Carotene
- 2: 13-cis β -Carotene
- 3: trans α -Carotene
- 4: trans β -Carotene
- 5: 9-cis β -Carotene



Column: YMC Carotenoid (5 μ m) 250 x 4.6 mm ID
 Part No.: CT99S05-2546WT
 Eluent: MeOH / MTBE = 80/20
 Flow: 2.0 mL/min
 Detection: UV at 450 nm
 Temperature: 35 °C

References

- [1] Sander, L.C. and S.A. Wise; J. Chromatogr. 1993, 656, 335-351
- [2] Sander, L.C. et al.; Anal. Chem. 1994, 66, 1667-1674
- [3] Block, G. and L. Langseth, "Antioxidant Vitamins and Disease Prevention", Food Technology July 1994

^a Courtesy of L.C. Sander, NIST, Gaithersburg, NC, USA

^b Courtesy of J. Schmid, Institut für Seenforschung, Langenargen, Germany