Use of C30 as a General-Purpose Stationary Phase for a Broad Range of Applications

1Michael Heidorn, 2Xiaodong Liu, 2Mark Tracy, and 2Christopher Pohl
1Thermo Fisher Scientific, Germering, Germany; 2Thermo Fisher Scientific, Sunnyvale, CA, USA

Introduction
The C30 column is a reversed-phase HPLC column. Like C18 phase, the C30 phase can be used in a broad range of applications in food and beverage, chemical, environmental, formulated supplements, academia, and other industries. The C30 column offers several unique features that set it apart from its C18 counterpart. First, it exhibits higher shape selectivity suited to separation of hydrophobic, long-chain, structural isomers (e.g., carotenoids, steroids, fatty acids, etc.). Second, it is fully compatible with various aqueous buffers, allowing for a broader application range (e.g., water-soluble vitamins, organic acids, etc.) and more flexibility in method development. Third, it is a viable alternative to normal-phase columns for lipid analysis. This work demonstrates use of the C30 column, not only as a general-purpose column that complements C18 column, but also as a specialty column when a C18 column fails to provide satisfactory results.

Acclaim C30 and Its Features
The Thermo Scientific Acclaim C30 column is designed to provide high shape selectivity for separating hydrophobic structurally related isomers and unique selectivity complimentary to other reversed-phase columns (e.g., C18). The column is based on covalent attachment of an alkyl chain to a porous silica gel particles. A combination of advanced surface modification technology and careful matching of C30 alkyl chain with the pore size of the silica substrate provides the following benefits:

- High shape selectivity
- Unique selectivity complimentary to other reversed-phase columns
- Compatibility with highly aqueous mobile phases
- High-quality, rugged columns with low-column bleed and high efficiency.

Specifications
Acclaim C30 Column

- Column Chemistry: C30 alkyl chain
- Silica Substrate: Spherical, high-purity
- Particle Size: 3 and 5 μm
- Porous Size: 200 Å
- Opening pH Range: pH 2–8
- Operating Temperature: up to 60 °C
- Endurance Compatibility: 100% aqueous
- Solvent Compatibility: 1–100% organic

Applications
Carotenoids
Carotenoids occur naturally in the chloroplasts and chromoplasts of plants, and in many algae. They serve two key roles in plants and algae: 1) absorb light energy for use in photosynthesis, and 2) protect chlorophyll from photodamage. In humans, four carotenoids (β-carotene, α-carotene, γ-carotene, and β-cryptoxanthin) have vitamin A activity and serve as antioxidants. As shown in Figure 1, six common carotenoids and chlorophyllin in vegetables are separated on the Acclaim C30 column with excellent selectivity and resolution.

Omega-3 fatty acids
Omega-3 fatty acids are a family of unsaturated fatty acids that share a trienoic carbon–carbon double bond in the n-3 position. Omega-3 fatty acids, such as eicosapentaenoic acid (20:5, n-3; EPA), and docosahexaenoic acid (22:6, n-3; DHA), are important in human nutrition. The biological effects of omega-3 are largely mediated by their interactions with the omega-6 fatty acids. Some medical research suggests that excessive levels of omega-6 relative to omega-3 fatty acids may increase the probability of several diseases and depression. As shown in Figure 9, the Acclaim C30 column exhibits excellent resolution power for a suite of closely related omega fatty acids.

Conclusion
Point 4. Compared to C18 columns, the Acclaim C30 column provides higher shape selectivity and improved aqueous compatibility. Therefore, it can be used as a general-purpose reversed-phase column for a broad range of applications including food and beverage, chemical, environmental, or the pharmaceutical and academic, and others. Because of its unique chromatographic properties, the Acclaim C30 column can also be used as a complementary or a specialty column for lipid analysis when C18 columns fail to provide satisfactory results.