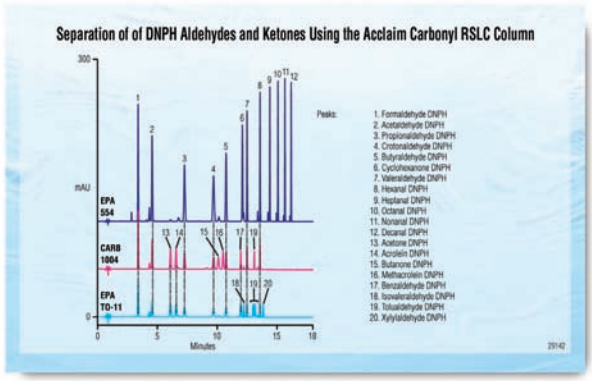
Thermo Scientific Acclaim Carbonyl Columns

Thermo Scientific™ Acclaim™ Carbonyl columns provide the highest resolution and throughput for separation of aldehyde and ketone contaminants in the environment. The Acclaim Carbonyl columns are silica-based reversed-phase columns designed specifically for superior resolution and high-throughput separation for DNPH derivatives of aldehydes and ketones regulated by U.S. Environmental Protection Agency (EPA) in methods such as EPA 554, EPA 8315, EPA 1667, EPA TO-11, and by California Environmental Protection Agency Air Resources Board in method CARB 1004.

Features

- Ideal selectivity for baseline resolution of DNPH derivatives of aldehydes and ketones regulated by various official methods, including EPA 554, EPA 8315, EPA 1667, EPA TO-11, and CARB 1004
- High efficiency for UHPLC performance
- Rugged columns with good lot-to-lot reproducibility
- Proven robust methods



Challenges in Analysis of Aldehydes and Ketones

Carbonyl compounds, including low molecular weight aldehydes and ketones have environmental and health concerns. Carbonyl compounds from motor vehicle and industrial emissions are precursors to ground-level ozone, a major component of smog, and are strongly associated with respiratory and pulmonary problems. They are also found in food and drinking water and various indoor living and working environments. For example, formaldehyde, a common indoor pollutant, is released from numerous sources including plywood, furniture, paper products, glues, cosmetics, tobacco smoke, and many others. Formaldehyde and acetaldehyde have been classified as probable or known human carcinogens by regulatory agencies including the U.S. EPA and International Agency of Cancer Research (IARC). In addition, formaldehyde contributes to the formation of photochemical ozone.

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Because of their highly volatile and reactive nature, carbonyl compounds are often converted to the dinitrophenylhydrazine (DNPH) derivatives prior to analysis. While gas chromatography (GC) methods have been developed for detecting these compounds, the HPLC-UV method is the most commonly used technique for the analysis of carbonyl-DNPH derivatives. U.S. EPA has published several methods for the determination of carbonyls in ambient air (EPA TO-11), ambient indoor air (EPA 8315A Procedure 2), drinking water (EPA 554), and aqueous, soil, waste and stack samples (EPA 8315A Procedure 1). In addition, California Environmental Protection Agency Air Resources Board uses CARB Method 1004 for monitoring aldehydes and ketones in automobile engine exhaust.

C18 columns are traditionally used for determination of carbonyl compounds, but limited by poor resolution and long run times. While sub-2-µm general-purpose reversed-phase UHPLC columns shorten analysis time significantly, it is still challenging to achieve baseline separation. Acclaim Carbonyl columns are high-performance, reversed-phase columns specifically designed for high throughput and baseline separation of 13 DNPH derivatives of aldehydes and ketones regulated by CARB Method 1004. In addition, the same chromatographic method can be applied directly to other regulatory methods such as EPA 554, EPA 8315, and EPA TO-11.

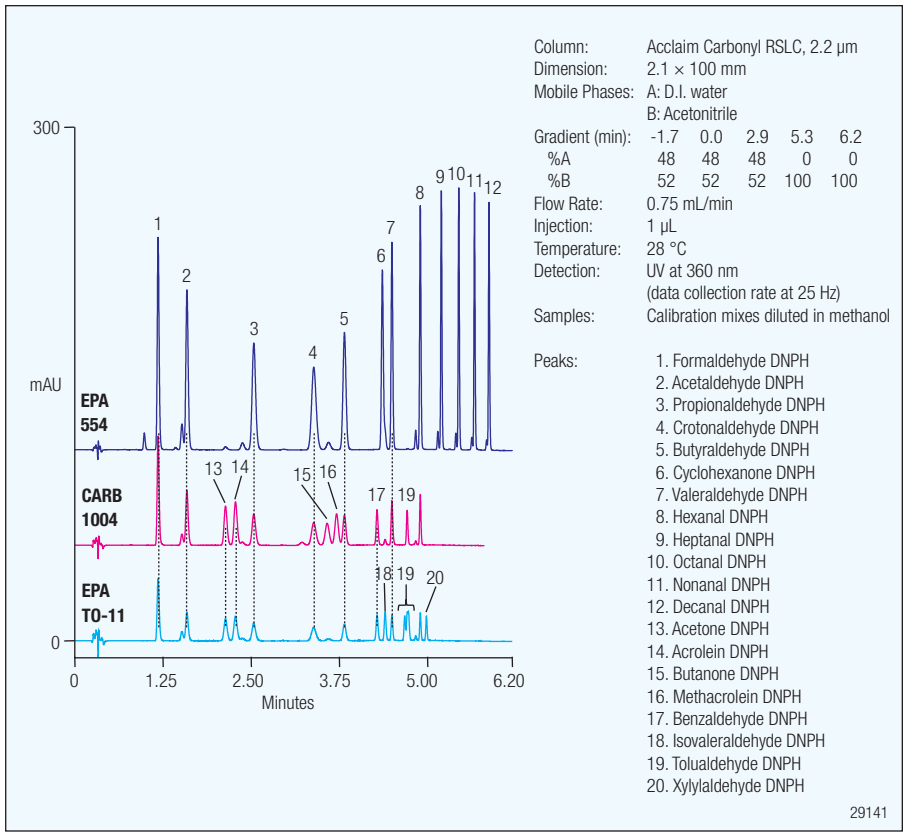

Figure 1. High-throughput analysis of DNPH aldehydes and ketones regulated by CARB 1004, EPA 554, and EPA TO-11 methods.

Acclaim Carbonyl Column for Superior, High-Resolution, and High-Throughput Separation of Aldehyde and Ketone DNPH Derivatives

The unique column chemistry of Acclaim Carbonyl columns provide ideal selectivity for the separation of all 13 DNPH derivatives of aldehydes and ketones regulated by CARB Method 1004. In addition, the same method can be directly used for the determination of aldehydes and ketones regulated by EPA 554, EPA TO-11, EPA 8315, and EPA 1667 methods. Use of 2.2 µm particles results in high peak efficiency for fast analysis, less susceptibility to sample fouling, and lower operating pressure. In addition, smaller i.d. column columns (e.g., 2.1 and 3.0 mm) consume less solvents.

For high-throughput application, the 2.1 × 100 mm column format combined with high linear velocity should be considered. Figure 1 features the high-throughput analysis of aldehydes and ketones DNPH derivatives in CARB 1004, EPA 554, and EPA TO-11, with excellent resolution and fast analysis time (less than 8 min).

When high-resolution power is desired, a longer column (2.1 × 150 mm) can be used at an optimal linear velocity (~0.4 mL/min) to achieve even better resolution within 23 min (Figure 2).

Figure 3 demonstrates Acclaim Carbonyl RSLC column separation of all 12 analytes in 9 min using the EPA Method 554 recommended conditions, which uses methanol/water as mobile phases. For standard HPLC instrumentation, the Acclaim Carbonyl stationary phase is also available in 3 µm or 5 µm particle sizes, and several popular dimensions.

Reproducible Manufacturing

Each Acclaim Carbonyl column is manufactured to strict specifications to ensure column-to-column reproducibility. Each column is individually tested and shipped with a qualification assurance report.

References

1. http://www.arb.ca.gov/msprog/levprog/cleandoc/clean_nmogtps_final.pdf
2. http://www.epa.gov/ttn/amtic/files/ambient/airtox/to-11ar.pdf
3. http://www.epa.gov/waste/hazard/testmethods/sw846/pdfs/8315a.pdf
4. http://www.restek.com/restek/images/external/59521B.pdf

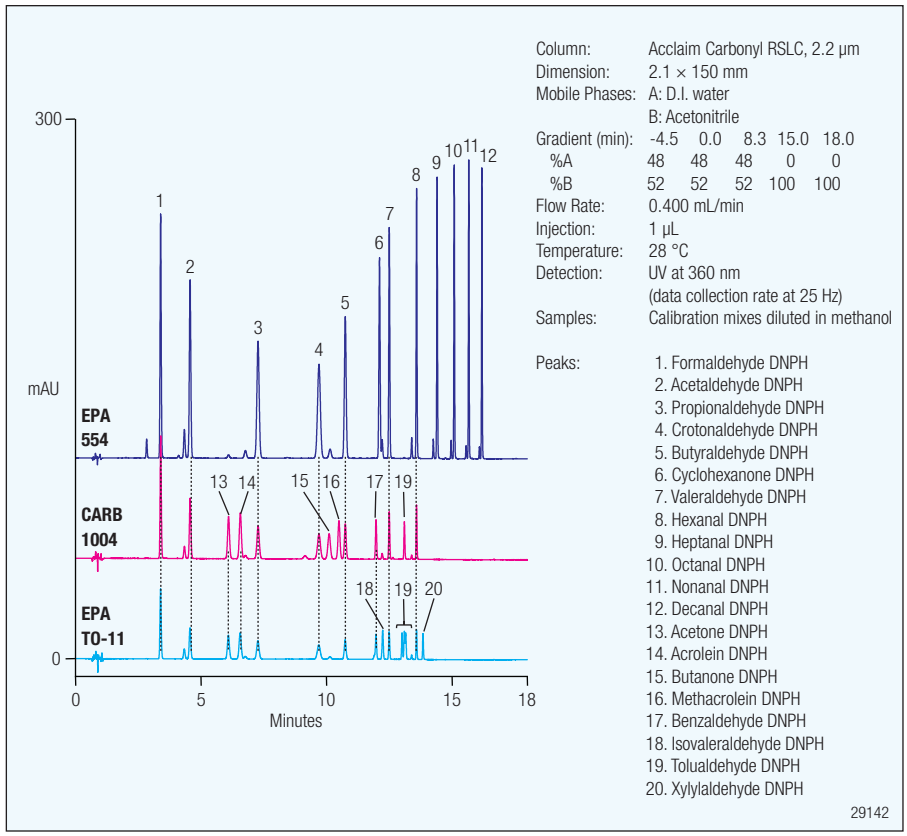

Figure 2. High-resolution separation of DNPH aldehydes and ketones on a 2.1 × 150 mm Acclaim Carbonyl RSLC column.

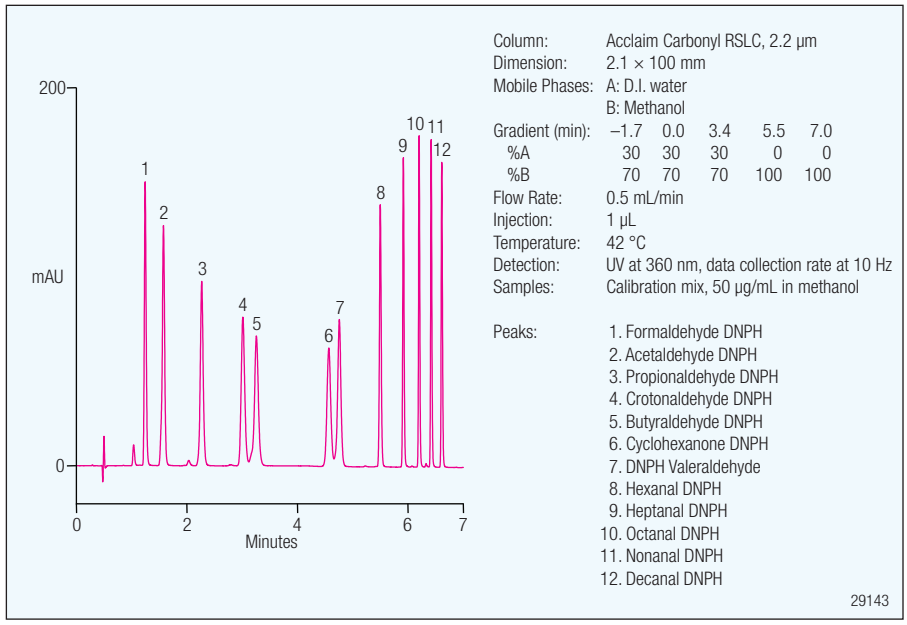

Figure 3. Separation of 12 carbonyl compounds regulated by EPA 554.

SPECIFICATIONS

Base Silica:	High purity, spherical, porous
Particle Sizes:	2.2 µm, 3 µm and 5 µm
Average Pore Size:	120 Å
Surface Area:	300 m^2/g
pH Range:	2.5 to 7.5
Temperature Limit:	50 °C

Acclaim Carbonyl Columns	Particle Size	Length	2.1mm ID	3.0mm ID	4.6mm ID
RSLC Analytical	2.2 µm	100 mm 150 mm	077972 077973	077974	
Analytical	3 µm	150 mm 250 mm	079011	079010 079009	
	5 µm	150 mm 250 mm			079008 079007
Guard	5 µm	10 mm	079012	079013	079014

For more information visit: www.thermoscientific.com/chromatography

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