

## A Q&amp;A

## Helpful HPLC Columns You May Not Know About



**Dr. Joe Pesek**  
Professor Emeritus  
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**C**ogent TYPE-C™ (high-performance liquid chromatography) HPLC columns are considered by experts to be a great tool for chromatographers, yet remain unknown by many scientists. *LCGC* recently spoke with Dr. Joe Pesek, Professor Emeritus at San Jose University, about how Cogent Type-C Silica™ columns are suited for polar, non-polar, and water labile compounds and how using these columns can save time and money while providing great data not easily achieved with other columns.

**LCGC: Please describe your background, your research, and how it led to Cogent TYPE-C™ HPLC columns?**

**Pesek:** I was Professor of Analytical Chemistry at San Jose State University for 41 years, and during this time my research focused on the development of new stationary phases for HPLC and columns for capillary electrophoresis. It was this basic research that led to the development of the Cogent TYPE-C™ columns.

Our research group has published more than 100 papers in peer-reviewed journals related to TYPE-C™ column technology and applications.

**LCGC: What are TYPE-C™ Silica HPLC columns?**

**Pesek:** TYPE-C™ columns are based on silica-hydride, as opposed to the ordinary silica used for most commercial HPLC columns. The stationary phase surface is populated with silicon hydride (SiH) moieties, while ordinary silica has silanols on the surface.

**LCGC: What makes this column different from all other columns commonly used today?**

**Pesek:** The silica-hydride surface is unique, yet not different to use. It is mildly hydrophobic

with SiH groups instead of strongly polar because of the silanols on ordinary silica.

The hydride surface acquires a negative charge as a result of the auto dissociation of water when the mobile phase has a high organic content. Thus, any column based on silica hydride can operate in both the reversed-phase and normal-phase modes, referred to as aqueous normal phase for silica hydride phase.

Depending on the analyte, both mechanisms can operate simultaneously, thus allowing for the separation of polar and non-polar compounds in a single run. There is low water content on the surface so that columns equilibrate very rapidly, especially the aqueous normal-phase mode in comparison to hydrophilic interaction chromatography (HILIC) columns. This gives the scientists an array of new tools not possible before, or with, other columns in the market.

**LCGC: Why should anyone spend time learning about this new way to separate hard to resolve compounds?**

**Pesek:** The ability of these compounds can be acquired quickly. In the long run, the TYPE-C™ columns provide unique separation capabilities, have long lifetimes, and often result in faster analysis times. Better chromatography with faster development

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cycles can be achieved. Therefore, the time spent learning the technique is well returned in the long run.

**LCGC:** In addition to faster development cycles, can you expand on the advantages of using TYPE-C™ columns?

**Pesek:** It is well known that at low pH, other phases based on ordinary silica using organosilane chemistry hydrolyze because of the silicon-oxygen-silicon-carbon linkage at the surface. This is especially true of end-capping. The TYPE-C™ phases have a direct silicon-carbon linkage. Some phases even have a double silicon-carbon linkage. There is no need to adsorb and desorb water because there is less than one-half of a monolayer on the surface (requiring only two to five column volumes for the pull-up rate), while many HILIC phases have a substantial water layer on the surface and can often necessitate 15 to 20 column volumes for equilibration.

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Better chromatography with faster development cycles can be achieved.

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Also, columns have long lifetimes. Data on individual columns are highly reproducible, usually less than 0.3% RSD for consecutive runs, and very reproducible from column to column.

**LCGC:** How might TYPE-C™ columns be used to support the development of greener methods?

**Pesek:** Less organic solvent is used for equilibration so that less mobile phase must be disposed of, thus making it greener. Lower amounts of additives are used in the water component of the mobile phase, making disposal easier. Longer column lifetime means fewer columns are discarded.

**LCGC:** Which specific applications would you say are best served by this column?

**Pesek:** The easy analysis of polar compounds is a prime advantage of TYPE-C™ columns. However, because many different surface modifications are available, there are many excellent applications in the reversed-phase mode. Another unique feature is the ability of one column, the Diamond Hydride, to analyze all peptides from the most hydrophobic to the most hydrophilic in a single run.

Prep laboratories have found these columns especially useful with greater yield of polar compounds.

**LCGC:** Where is additional information about TYPE-C™ columns available?

**Pesek:** Further information can be found on the MicroSolv website, [mtc-usa.com](http://mtc-usa.com).

Go to the tab in the upper right portion of the home page marked “Knowledge Space.” Under that heading, there will be additional links about the properties and advantages of TYPE-C™ silica, as well as a link to the more than 300 applications listed by company name, column type, and field of analysis (e.g., pharmaceuticals, food, and metabolites).

**LCGC:** Is technical support usually offered to onboard these columns into chromatography laboratories?

**Pesek:** Technical support is offered by a team of scientists with extensive experience using TYPE-C™ columns. It is always fun working with scientists for the first time and watching their pleasure when they achieve great results for the first time.

The technical team enjoys interacting with customers and try to provide as much support as possible.

**LCGC:** Where can listeners buy these columns? And are they offered globally?

**Pesek:** These columns are available through MicroSolv Technology Corporation and through its North American dealer network, which includes—but is not exclusive to—VWR and Fisher, as well as many local and independent dealers in almost every country.

**MicroSolv Technology Corp.** manufactures Cogent TYPE-C™ HPLC columns serving the chemistry, medical, clinical R&D, and biological laboratories. A worldwide distribution network includes VWR International in North America, Hichrom LTD, ML Sciences, PM Separations, and others.