



TECH TO BUSINESS

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## Green, Efficient Chromatography using Water & Carbon Dioxide

Technology ID# 658.7

### Background

University of Calgary researchers have developed an efficient, environmentally compatible method of separating chemical compounds by exploiting the limited miscibility between water and carbon dioxide. Using a conventional capillary and optimized temperature and pressure, a water stationary phase and carbon dioxide mobile phase are simultaneously generated. This unique system is capable of separating various types of organic compounds. Tuning the temperature, pressure, and flow rate of the system affords an even more selective separation tool and the option of gradient programmed separations. In terms of performance, the water/carbon dioxide system requires little to no sample preparation, offers quick throughput times, and affords competitive sample capacity, peak symmetry, and retention time reproducibility. The system can also be coupled with universal flame ionization detection. Compared to other chromatography techniques that employ organic materials as stationary and/or mobile phase components, the water/carbon dioxide system is less expensive, safer, and more environmentally sensible.

### Areas of Application

- Separation of components in biofuels, alcoholic or caffeinated beverages
- Chromatographic analysis of pharmaceutical purity
- Routine separation and analysis of organic mixtures

### Competitive Advantages

- Inexpensive reagents
- Minimal sample preparation
- Good sample capacity
- Rapid compound separation and analysis
- Excellent peak symmetry
- Reproducible, accurate retention times
- Compatible with flame ionization detection
- Non-hazardous, environmentally friendly stationary and mobile phases

### Stage of Development

- Ethanol selectively quantified from neat E10 gasoline (10% ethanol)
- Caffeine selectively quantified from neat energy beverage at 20 °C
- Separation of a C<sub>1</sub>-C<sub>5</sub> n-alcohol mixture at moderate temperature in <15 minutes, at higher temperature in <10 minutes

# TECHNOLOGY



- Separation of a model C<sub>2</sub>-C<sub>8</sub> carboxylic acid mixture in ~20 minutes
- Retention time reproducibility: ~1% relative standard deviation (RSD) run-to-run, ~4% RSD day-to-day

## Intellectual Property Status

- Provisional patent filed

## Publications

- [Anal. Chem. 2010 Nov;82\(24\):10060-7.](#)