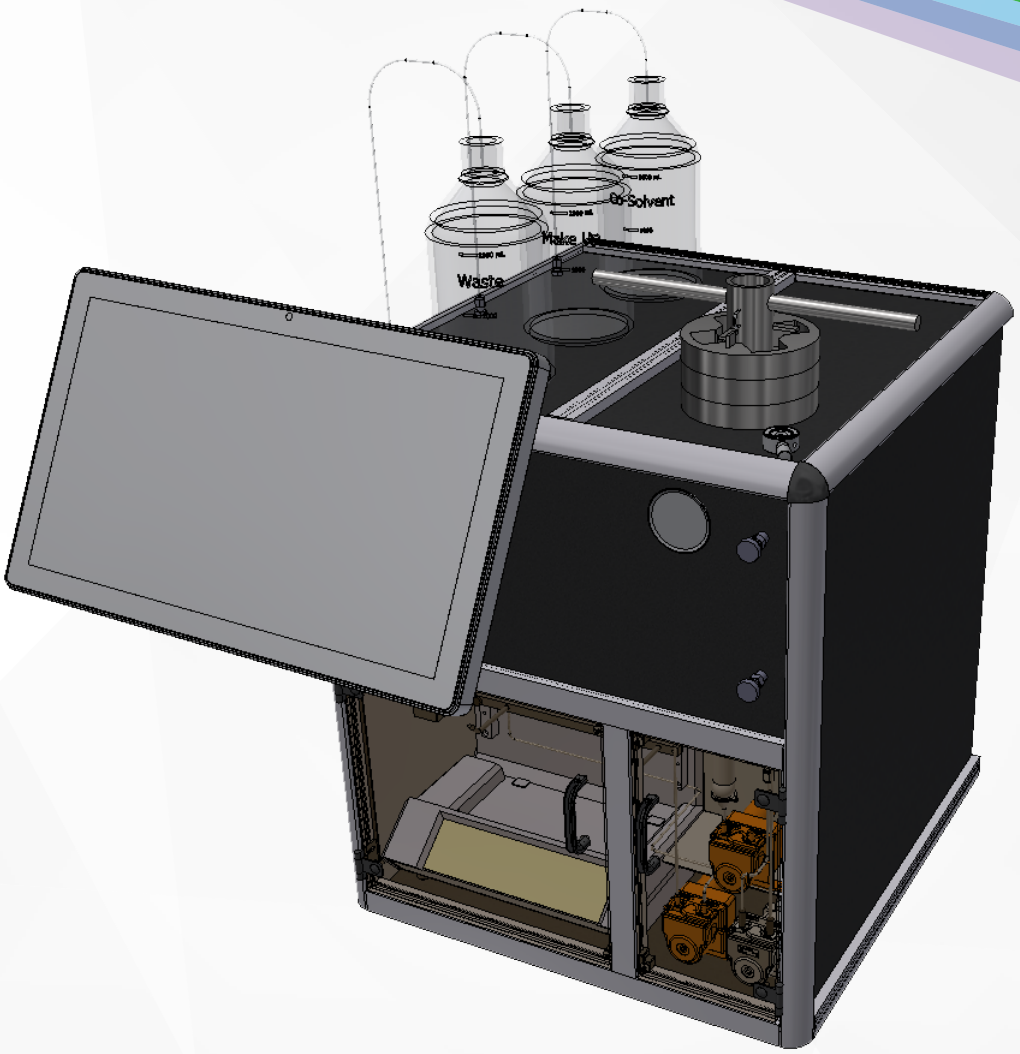
Coming in 2024

Green Flash™ Chromatography



G-Flash, LLC

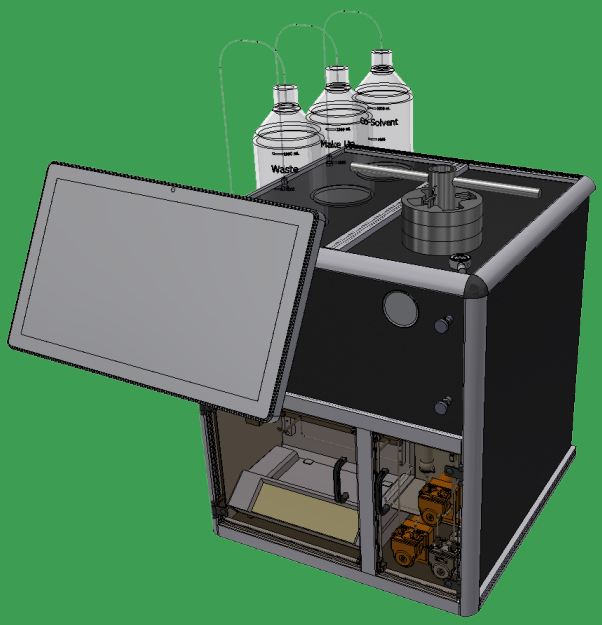
1 Innovation Way, Suite 303
Newark, DE 19711
302-738-3420

www.GflashLLC.com

The Future Is G-Flash!

G-Flash LLC, in conjunction with Supercritical Fluid Technologies Inc., is proud to introduce the Green Flash Chromatography (GFC™) system.

GFC™ was developed to offer chemists an alternative to the traditional Flash Chromatography for the fast, efficient separation of organic compounds. GFC™ offers cost savings, workflow improvements, technological capability improvements, and environmental health and safety advantages over traditional solvent based Flash Chromatography. By replacing approximately 80% of the organic solvent currently used in Flash Chromatography, it provides tremendous cost savings in solvent cost alone. Less solvent to evaporate improves workflow and results in more environmentally sound separations of pharmaceutical and biopharmaceutical compounds. GFC™ maintains the convenience of using inexpensive and disposable plastic cartridges like traditional flash.

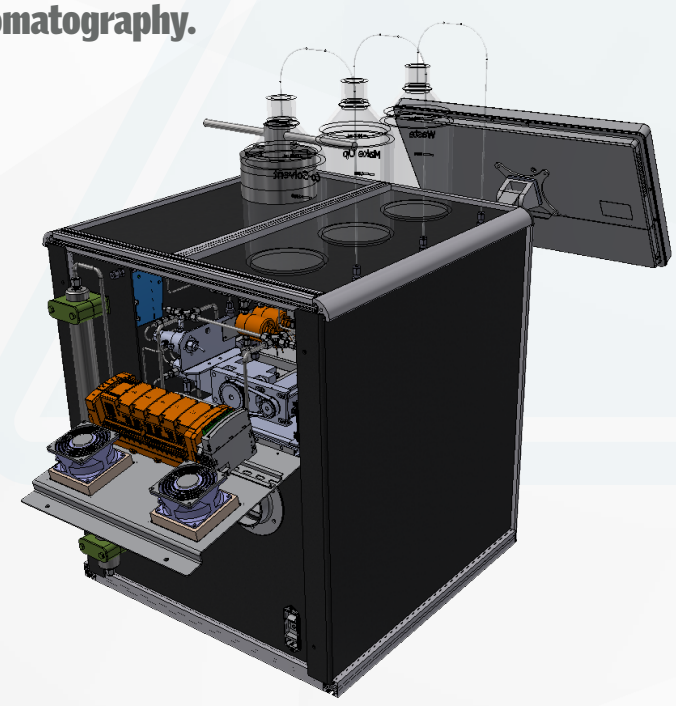


G-Flash LLC, in conjunction with Supercritical Fluid Technologies Inc., is proud to introduce the Green Flash Chromatography (GFC™) system.

GFC™ was developed to offer chemists an alternative to the traditional Flash Chromatography for the fast, efficient separation of organic compounds. GFC™ offers cost savings, workflow improvements, technological capability improvements, and environmental health and safety advantages over traditional solvent based Flash Chromatography. By replacing ~80% of the organic solvent currently used in Flash Chromatography, it provides tremendous cost savings in solvent cost alone. Less solvent to evaporate means greatly improved laboratory workflow, and results in more environmentally sound separations of pharmaceutical and biopharmaceutical compounds. Further, GFC maintains the convenience of using inexpensive and disposable plastic cartridges like traditional flash.

GFC™ uses supercritical carbon dioxide as its primary solvent and sc-CO_2 is fundamentally more efficient than using traditional organic solvents in Flash Chromatography. Supercritical carbon dioxide is a powerful yet environmentally friendlier solvent substitute. It has both the density of a liquid and the properties of a free-flowing gas, making it an ideal chromatography processing solvent in place of liquid organic solvents. Supercritical CO_2 has some level of tunable polarity to solvate and separate polar mixtures for therapeutic drug development, and recent research indicates that the addition of chaotropic modifiers show greater separation promise by decreasing the net hydrophobic effect of solute hydrophobic regions, improving solubility in sc-CO_2 by denaturing analytes.

GFC™ will be able to perform separations not currently possible with traditional flash chromatography.



Why GreenFlash?

GreenFlash® Chromatography versus Traditional Liquid Flash Chromatography

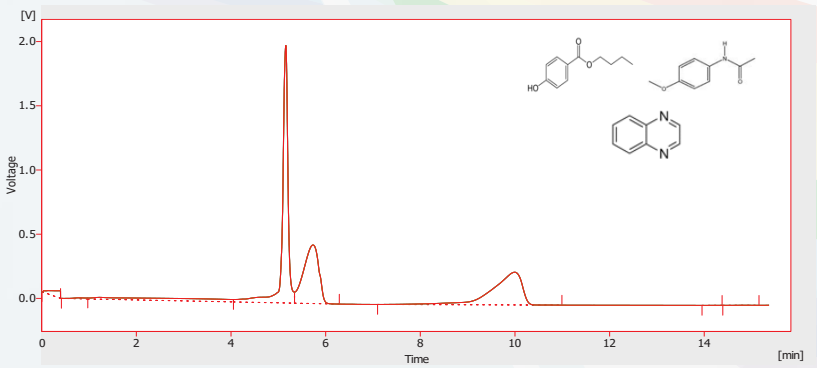
- GFC™ achieves significant cost savings through the reduction in organic solvent requirements; both the cost to acquire and the disposal costs.
- GFC™ is a more powerful tool for separating compounds due to superior solvation power of a supercritical fluid for separation capability beyond that of traditional flash including peptides and biomolecules.
- GFC™ affords greater laboratory productivity through improved workflow, reducing the time required to evaporate residual solvents.
- GFC™ improves health and safety for employees by greatly reducing exposure to solvents that are toxic, flammable, carcinogenic, and often neurotoxins. The small amounts of co-solvents used are generally alcohols that are safer than the solvents commonly used in traditional flash chromatography.

Chromatography

Traditional flash chromatography has significant limitations both in its capabilities and the impediment it presents to efficient workflow in the laboratory. For example, as therapeutic peptides become increasingly important in drug development, a better method to perform crude separations is essential. Peptide drugs are essential molecules in the pharmaceutical industry with a multiplicity of therapeutic properties, such as being anti-hypertensive, anti-microbial, anti-diabetic, and having anti-cancer potential. In the area of SARS-Covid research, over 50 peptides are known to inhibit SARS-CoV-1. This is a critical area of research. With a suite of chaotropic modifiers, GFC™ is the separation solution.

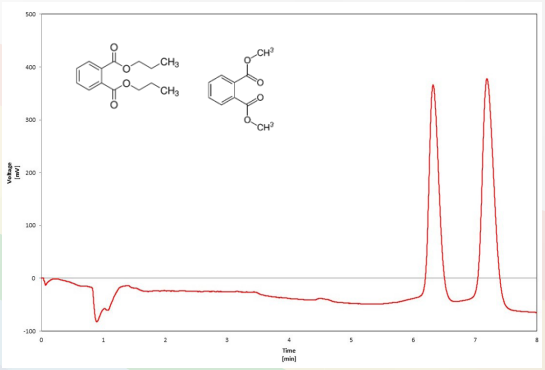
Examples of more traditional small molecule flash separations with the GFC™ platform are below.

Butyl Paraben, Quinoxaline, and 4′-Methoxyacetanilide



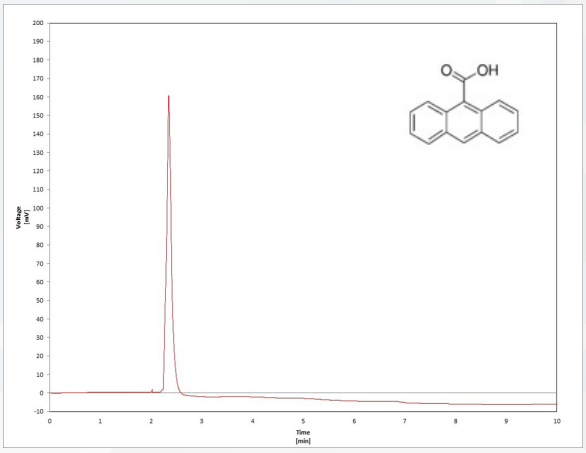
sc-CO_2/Methanol - 280nm, 2-17% MeOH Gradient, 12g/15micron cartridge

Dimethyl Phthalate and Dipropyl Phthalate



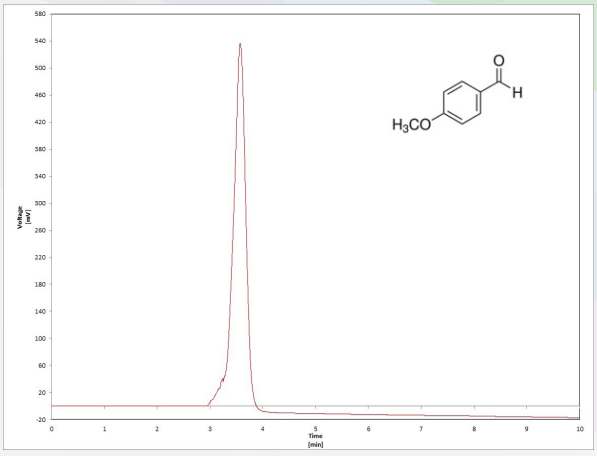
sc-CO_2/Methanol, 254nm, 5%-30% methanol gradient

9-anthracene



sc-CO_2/Ethyl Acetate – 254nm and 290nm, 5-20% Ethyl Acetate Gradient, 12g/15 micron cartridge

p-anisaldehyde



sc-CO_2/Ethyl Acetate – 254nm and 290nm, 5-20% Ethyl Acetate Gradient, 12g/15micron cartridge

GFC™ Specifications

- Joule Thompson, subzero cooled, precision sc-CO_2 and cosolvent pump heads for a total 1.0 to 75.0 ml/min range of process Method flow.
- Cosolvent addition pump compatible with most traditional polar mobile phase eluents such as methanol, ethanol, and ethyl acetate.
- Pressure Containment Assembly (PCA) with cartridge anti-leak technology allowing for the use of traditional plastic Flash Chromatography cartridges at the pressures required for sc-CO_2 Flash Chromatography.
- Automatic SC-CO_2 and cosolvent gradient programming precision control for Method runs ranging from 2 to 60 minutes.
- Data acquisition powered by a Clarity software platform for chromatogram capture, data manipulation, and analyte separation.
- 22" Touch Panel PC that seamlessly merges system control and data acquisition in a sleek design.
- 200 - 600 nm Scanning PDA UV detector that measures up to four wavelengths simultaneously.
- Gas-liquid separator for less than 5 percent analyte loss from aerosol overspray and less than 2% dispensed analyte cross-contamination between runs.
- Automatic eluate/analyte separation dispensing gantry with mobile phase waste management.
- Weight and Dimensions: 140 Lbs. 24" x 24" x 30" (64 kg. 61cm x 61cm x 76cm
- Onboard filtration and polishing system enabling use of commercial grade CO_2 dip tube for liquid delivery cylinders (nominal 850 psi, Tank heaters as needed).

Utility Requirements

- 230VAC single phase, 20 amps, 50/60Hz.
- Nitrogen cylinder (3,000 psi or higher)
- Liquid CO_2 cylinder with dip tube or bulk equivalent
- Ventilation for CO_2 and solvent exhaust (Connection to a 2" outlet)

Patents

G-Flash LLC has been awarded several patents for the key advances that protect the underlying technology essential to GFC™ platform. These patents are effective in the US, EU, and additional jurisdictions worldwide and include: US Patent 10,765,968: "System and Methods for Supercritical Fluid Chromatography", US Patents No 10,610,808 and 11,680,735: "Supercritical Fluid Chromatography System", US Patent 11,022,350: "Cooling Loop with a Supercritical Fluid System using Compressed Refrigerant Fluid Flow with a Positive Joule-Thompson Coefficient.", US Patent Application No. 17/416,964: "Interchangeable Chromatography Cartridge Adapter System" – Notice of Allowance, US Patent Application No. 18/485,807: "Gas Liquid Separator (GLS) for collection of sample eluent "– In process. Additional provisional patent filings are underway covering various technological advances for GFC™ platform.

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