

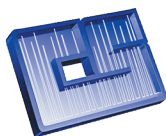


A Breakthrough Innovation Revolutionizing GC/FID Technology

Better Data Quality. Increased Throughput. More Economical.



The Polyarc® System Product Brochure



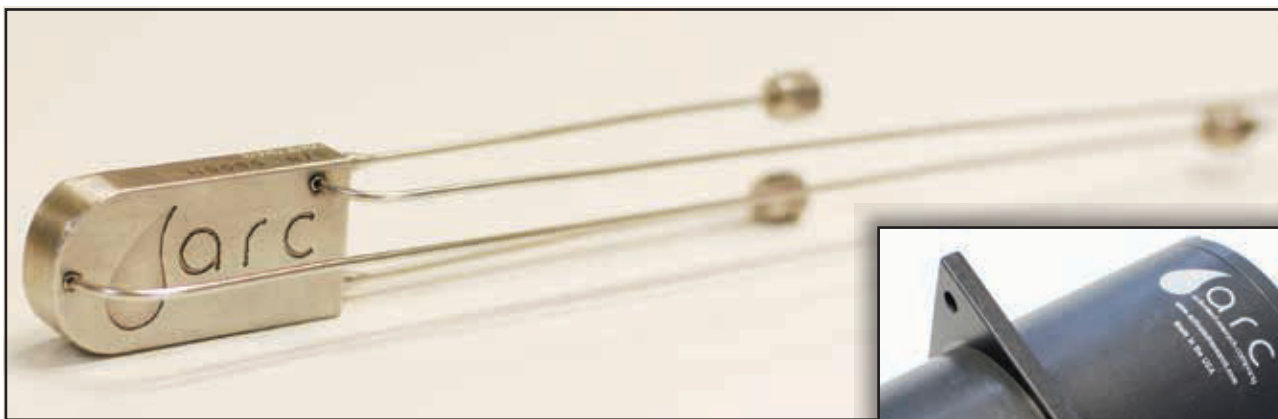
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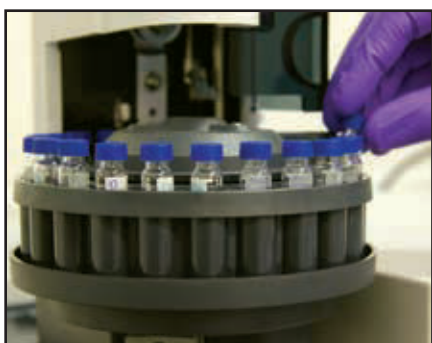
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The Polyarc[®] System: Transforming the Way Scientists Use Gas Chromatographs with Flame Ionization Detectors



The Polyarc system has a catalytic microreactor that enhances new and existing gas chromatographs (GCs) with flame ionization detectors (FIDs) by converting all organic compounds to methane molecules prior to their detection by the FID. In doing so, the Polyarc system reduces the need to perform time-consuming calibrations by creating a uniform detector response for truly universal carbon detection.



The Polyarc system gives scientists the capability to determine purity, quantify unknowns, qualify products, investigate, improve development and more in a simple, fast and more economical way that is transforming the industry.

"[This] is really the holy grail of chemical analysis."

Paul Dauenhauer, Professor at the University of Minnesota

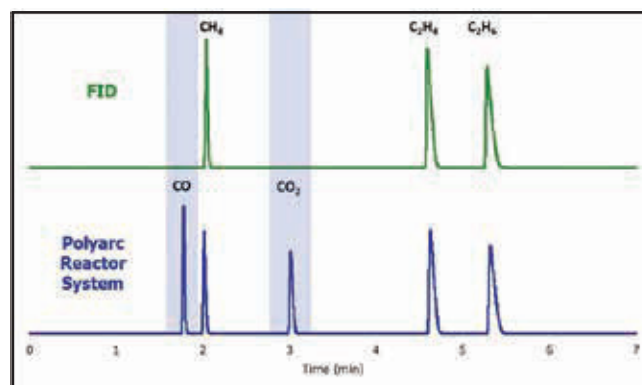
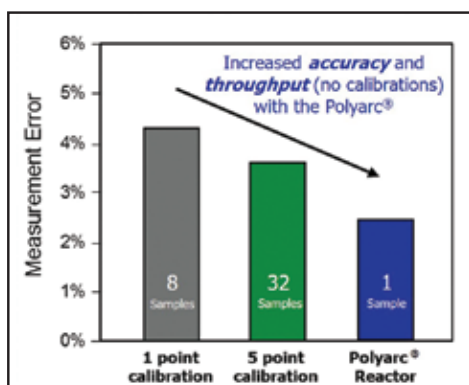
Discover the Benefits of Using the Polyarc® System

The Polyarc system is a breakthrough innovation that combines catalysis with chemical analysis to revolutionize 60 year old technology. It's easy to use and seamlessly integrates into new or existing GCs with FIDs.



BETTER DATA QUALITY

Improve FID accuracy, precision and sensitivity by detecting compounds once 'invisible' and reducing measurement error. Better data quality leads to improved decision making and more reliable products.



INCREASED THROUGHPUT

Reduce the need for traditional calibration curves and run fewer samples on the GC/FID, which saves time while accurately quantifying all species in sample. Simplified workflow means greater productivity.



MORE ECONOMICAL

Use valuable resources more efficiently by reducing or eliminating time and costs associated with:

- Purchasing/preparing calibration standards
- Analysis time to prepare and run calibration curves
- Increased wear on the GC/FID

SAME GC. SAME SOFTWARE. BETTER DATA.

"The Polyarc reactor...should be installed on every GC to eliminate the need for tedious calibrations and to facilitate closure of carbon balances when unknown species are detected."

Matthew Gilkey, Ph.D. Candidate at the University of Delaware

How Does the Polyarc® System Work to Simplify and Improve GC/FID Quantification?

The Polyarc system has a catalytic microreactor that enhances GC/FIDs by converting all organic compounds to methane molecules prior to detection by the FID. The result?

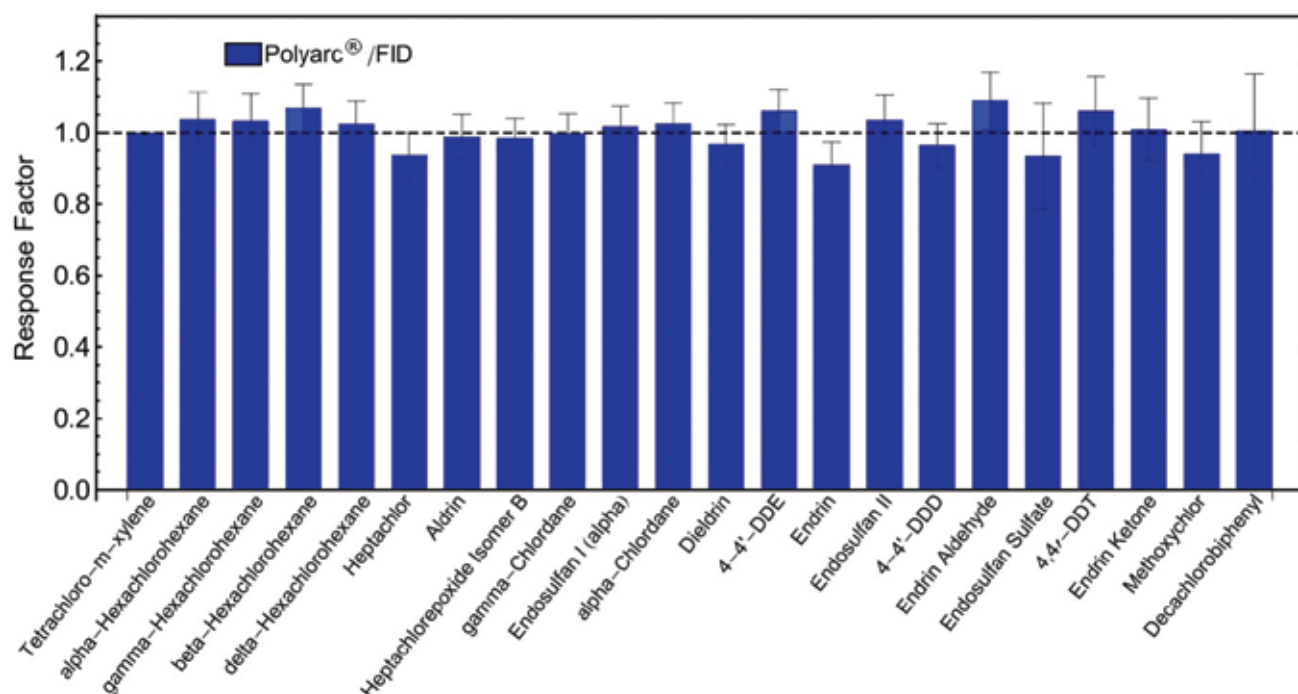
**A universal response for ALL organic molecules
with a conversion efficiency > 99.99%.**

Due to the universal response, RF=1 and only one equation is required to determine the carbon content and thus concentration of all species:

$$RF = 1 = \frac{\text{mol C} / \text{area}}{\text{mol C}_{\text{std}} / \text{area}_{\text{std}}} \implies \text{mol C} = \frac{\text{area} * \text{mol C}_{\text{std}}}{\text{area}_{\text{std}}}$$

'std' = internal standard

Accurate Quantification with RF=1 Using Splitless Direct Connect Liners



Response factors obtained for a 22-component organochlorine pesticide mixture using the Polyarc system.

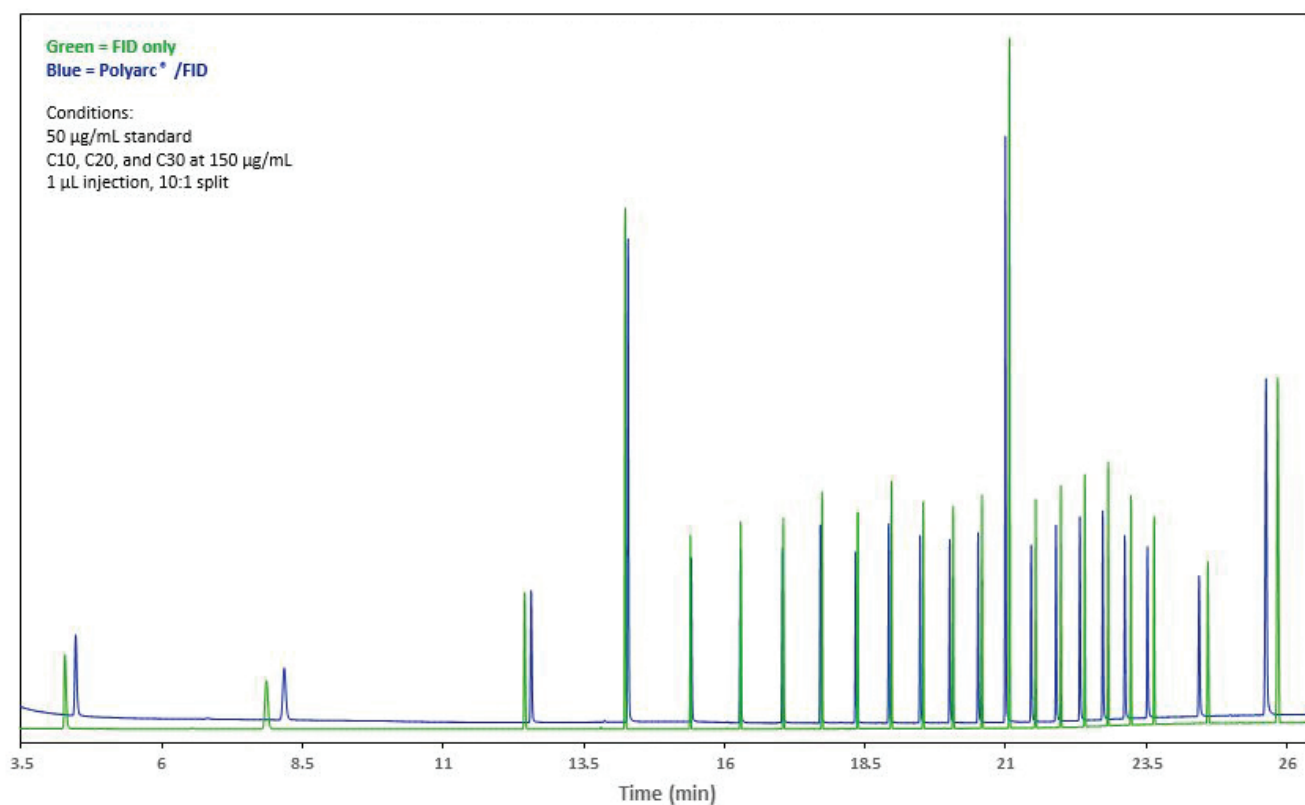
"In my opinion, I believe everyone should use a Polyarc reactor if they're using GC/FID. It's a simple choice because the Polyarc will only maintain or improve the sensitivity of compounds, especially for acids, which is a good thing."

Scientist at Multi-Billion Dollar Pharmaceutical Company

The Polyarc[®] System Features an Optimized Design and Seamless Integration

The Polyarc system is the first commercial technology of its kind. The device uses proprietary technologies including novel catalysts, a specially designed 3D-printed microreactor, and fast and seamless integration into existing equipment.

The optimized internal design and catalyst microstructure maintains separation performance and peak shape while increasing sensitivity and enabling accurate quantification without calibration standards.



“The use of the Polyarc to convert CO and CO₂ to methane to allow the use of FID vs. TCD afforded much superior detection limits for CO in air.”

Dr. Roger Pearson, President–Analytical Services at Aspen Research Corporation

Dr. Jean-Paul Schirle-Keller, Research Associate at the Flavor Research and Education Center, University of Minnesota

How Does the Polyarc® System Compare to a Methanizer?

A conventional methanizer converts CO and CO₂ to methane, allowing low level FID detection of CO and CO₂. The significant advantage of the Polyarc system is that it converts **all** compounds to methane, allowing not only for the detection of CO and CO₂, but also millions of other organic compounds.

The Polyarc system has significant advantages when compared to a methanizer.¹

	Polyarc® System	Methanizer
Universal Response	✓	✗
Sulfur Compatible	✓	✗
Capillary Column Compatible	✓	✗
>99.9% Conversion Efficiency	✓	✓
Easy Add-On to GC	✓	✗
Non-Toxic	✓	✗
Benefits	<ul style="list-style-type: none">• Reduce the need for traditional calibrations• Quantify compounds with unavailable commercial standards• Increase sensitivity for select compounds (CO, CO₂, formic acid, etc.)	FID detection of CO and CO ₂

(1) Based on research done by Activated Research Company (ARC).

"I've been working in the oil and gas field for the past 5 years and I think the Polyarc reactor will change the industry in the near future. I can see this technology improving many of the current ASTM test methods used in this field."

Nicholas DeMuth, AmSpec Technical

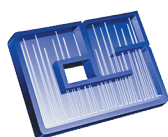


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