



TECH TO BUSINESS

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## Quenching-Resistant Detector for Hydrocarbon Samples

TECH ID #: 658.6

### Background

Researchers at the University of Calgary have developed a detection technology with superior resistance to signal quenching, high analyte sensitivity, and enhanced signal reproducibility over other approaches. This multiple flame photometric detector (mFPD) for gas chromatography exploits a series of flames to process hydrocarbon analytes (e.g., gasoline) and is particularly suited to sensing sulfur and phosphorus compounds in hydrocarbon mixtures. Applications include the analysis of complex oil & gas, environmental, and military samples.

Compared to conventional single and dual FPDs, the mFPD affords the best of both worlds—low quenching and high analyte sensitivity—by way of an unconventional five flame arrangement and optimized gas flow. The first four processing flames oxidize hydrocarbon components into CO<sub>2</sub>, thereby limiting the number of compounds that are detected. Then, analyte species can be detected primarily in the final flame without interference from other sample components. As in conventional devices, the analyte species emit photons that are collected by a photomultiplier tube and transformed into an electrical signal that is proportional to the quantity of analyte in the sample. Additionally this electrical signal can be converted into a visual spectrum for interpretation by the analyst.

### Areas of Application

Quantitative analysis of sulfur and/or phosphorus components in petroleum samples, pesticides, chemical warfare agents, and other environmental samples

### Competitive Advantages

- Minimized quenching (signal reduction) in the presence of co-eluting compounds
- High sensitivity (responsiveness) to analytes in complex mixtures
- Enhanced resolution

### Stage of Development

- A prototype has been designed, constructed, optimized, and successfully, reproducibly tested for proof-of-concept
- Sulfur compounds 1) added to commercial gasoline and 2) found innately in commercial diesel fuel can be detected with enhanced peak sensitivity
- Sulfur response can be maintained at higher hydrocarbon flow rates using the mFPD approach compared to single and dual device modes

# TECHNOLOGY



## Intellectual Property Status

Provisional patent filed

## Publications

- [Analytical Chemistry 2009 Oct 6;81\(21\):8858-67](#)
- [The Column 2010 Jan 22;6\(1\):2-5](#)