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CASE STUDY
Analysis of Perfluorinated Compounds (PFCs) for Food Contact Applications

STUDY
The US Food and Drug Administration (FDA) recently **banned the use of three perfluorinated compounds (PFCs) in food packaging** because they are structurally similar to other toxic substances. The chemicals in question are often used as grease-proofing agents in food containers. The goal of this project was to develop a method for the analysis of these perfluorinated compounds and to demonstrate the limit of detection (LOD).

ANALYTICAL STRATEGY
QTOF-LCMS was selected for detection and quantitation of PFCs.

CONCLUSIONS
A QTOF-LCMS method was developed for perfluorinated phosphates. A detection limit of 1-2.5 ppb was achieved.

Read the following report to see the full analysis.

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Company Name

Contact Name

Released by:

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Job Number: J10709

CONFIDENTIAL

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Date

Client Name
Company Name
Address

Phone
Email

Dear Valued Customer,

Please find enclosed the test results for your samples described as:

1. Sodium bis(1H, 1H, 2H, 2H-perfluorooctyl)phosphate (6:2diPAP)
2. Sodium bis(1H, 1H, 2H, 2H-perfluorodecyl)phosphate (8:2diPAP)
3. Perfluorohexylphosphonic acid (PFHxPA)
4. Perfluorooctylphosphonic acid (PFOPA
5. Perfluorodecylphosphonic acid (PFDPA)

The following tests were performed:

Quadrupole Time of Flight Liquid Chromatography Mass Spectrometry (QTOF-LCMS)

Objective

The goal of this project was to demonstrate the detection of a series of perfluorinated phosphonic acids and to determine the LOD.

Summary of Results

Perfluorinated phosphates were detected with a detection limit of 1-2.5 ppb.

Individual Test Results

A summary of the individual test results is provided below. All accompanying data, including spectra, has been included in the data section of this report.

Results

QTOF-LCMS was used to quantitate the five perfluorinated phosphate compounds. A representative chromatogram obtained for the 2.5 ppm standard mixture is shown in **Figure 1**. The first eluting peak corresponding to *Perfluorohexylphosphonic acid* is slightly split due to the presence of two different ionization states for this molecule. The full chromatographic conditions are listed in the Analysis Conditions section of this report.

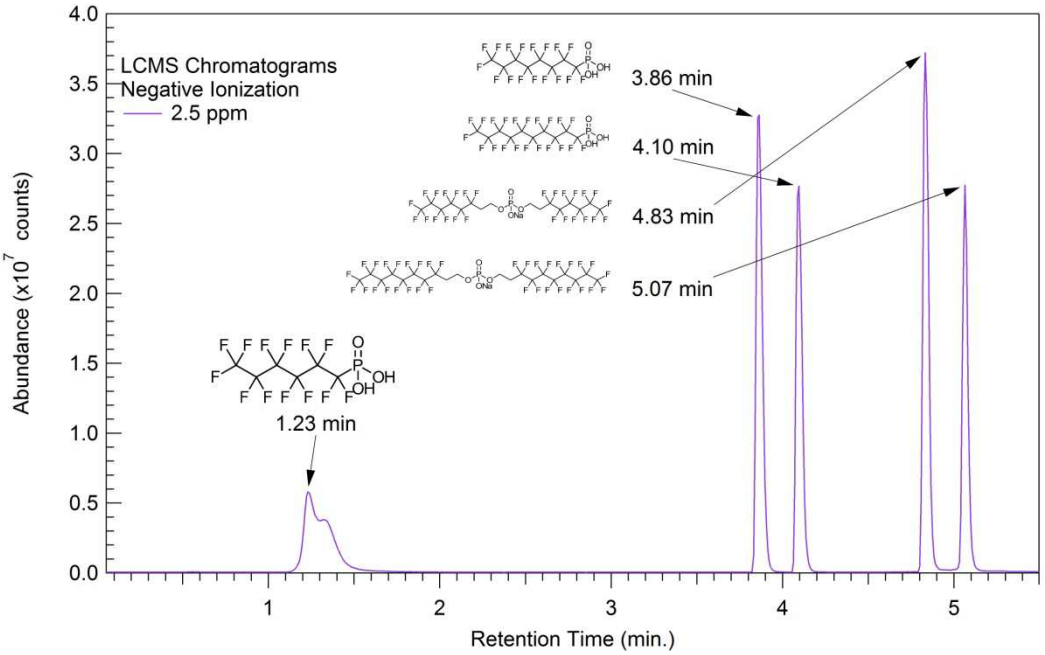

Figure 1: Chromatogram of Perfluorinated Phosphate Standard, 2.5 ppm

The Limit of Detection for perfluorinated phosphates was obtained by performing successive 10-fold serial dilutions and identifying the concentration at which the EIC-identified peak area dropped below a signal-to-noise ratio of 3:1 using the peak-to-peak from drift definition of noise with a 1 minute noise region (**Figure 2**). Plotting the peak areas of each compound yielded a linear region from 2.5 ppb to 2.5 ppm (**Figure 3**). Concentrations below this range exhibited insufficient signal to noise to accurately detect the compounds of interest.

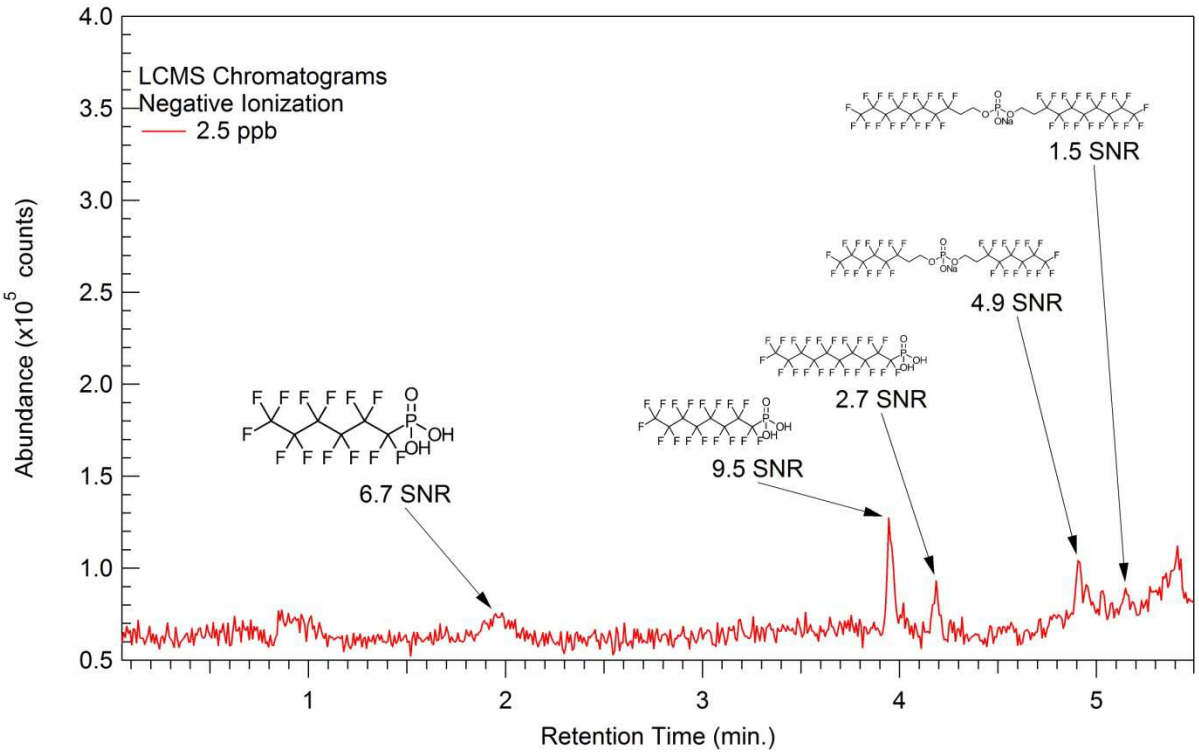

Figure 2: Chromatogram of Perfluorinated Phosphate Standard, 2.5 ppb

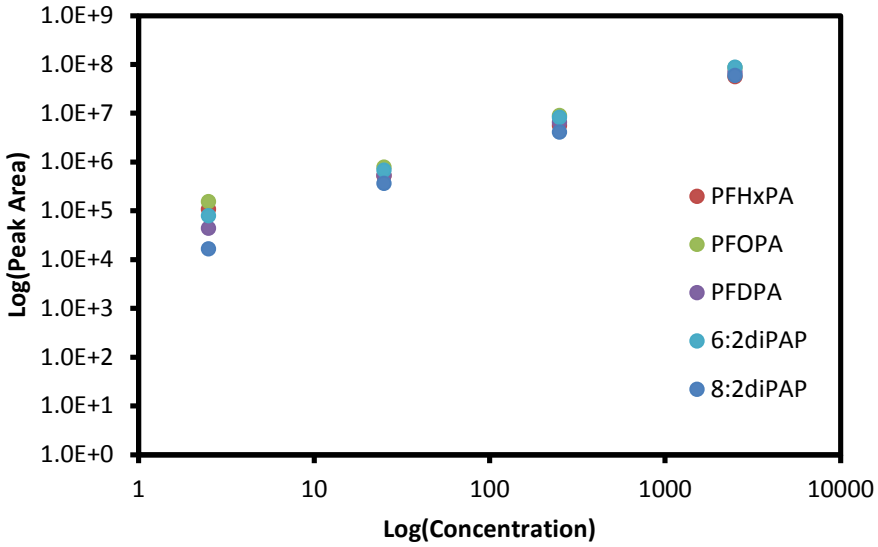

Figure 3: Log-log plot of Perfluorinated phosphate peak area to nominal concentration.

Analysis Conditions

QTOF LCMS

The following conditions were used for the QTOF-LCMS analysis:

Instrument: Agilent 6545 QTOF LCMS with Agilent 1290 HPLC system
Source: Dual ESI Source
Flow Rate: 0.4 ml/min
Temperature: 55ºC
Column: Agilent Extend C18 2.1 x 150mm; 1.8µm

Closing Comments

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Jordi Labs specializes in polymer testing and has 30 years experience doing complete polymer deformulations. We are one of the few labs in the country specialized in this type of testing. We will work closely with you to help explain your test results and solve your problem. We appreciate your business and are looking forward to speaking with you concerning these results.

Sincerely,

James Woods

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Mark Jordi

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