Mobile FTIR Analyzers from Agilent

Expedite Food QA/QC… Improve Food Production, Safety and Quality
Fully portable FTIR analyzers are now available for food industry applications.

- Get lab quality analytical results where and when needed with mobile FTIR analyzers from Agilent.
- Move analyses out-of-the-lab and closer to the sample source
- Get answers faster and make immediate actionable decisions about food quality.
- Proactively improve food manufacturing efficiency

Opportunity
The demand for on-site testing in the food industry is growing substantially.
Value of Mobile FTIR Solutions
For the Food Industry

More effectively ensure quality of food and food ingredients

- **Confirm** that ingredients in food are as per specification
  
  **Identify, verify, authenticate**
  - Rapid screening enables more samples to be analyzed and ensures the overall quality of a bulk ingredient shipment.
  - Rapid screening improves selection of samples for further analytical measurements.

- **Measure specific unwanted by-products** arising from food processing

- **Get answers at collection**, receiving sites and farms or fields

- **Enables decisions** that ensure that incorrectly labeled, substandard, or otherwise unacceptable ingredients never enter the manufacturing process.

**The opportunity**

Eliminate need to wait for results from traditional lab
Valuable New Analytical Methodology
For Mobile FTIR

For Food Production Industry and Organizations

• Producers and distributors of human and pet food ingredients (raw materials)
• Food processors and manufacturers of consumer human and petfood products
• Member companies of food manufacturing and ingredient organizations
• Major corporations that control farms and farm production
• Inspection and testing company
• Food research and product development organizations, academic and industrial

For Food Production Job Functions

• Manufacturing personnel in food industry
• QA/QC management and lab directors
• Analysts and methods development personnel who support food production
• Scientists developing new, safer or higher quality foods
Mobile FTIR Applications in Food and Food Production

- Authenticate food ingredients
- Analyze chemicals associated with food production and processing
- Detect food adulteration
- Provide quality assessments
Authenticate Food Ingredients

Need

- Confirm correct food ingredients
- Eliminate adulterated or out of spec ingredients

Location

- Field locations; collection, shipping and receiving sites
- Trucks, tanker cars, loading docks

Solution

- Agilent 4500 FTIR equipped with diamond ATR sample interface
- Library of food ingredients

Value

- Keep out-of-spec ingredients or foods from entering the food processing cycle
- Instantaneous verification of specific ingredient and overall compliance with specification

Analyze chemicals associated with food production and processing

Need

• Counterfeit, adulterated, or banned pesticides need to be quickly identified before distribution and application

Location

• At shipping, receiving and distribution sites

Solution

• Agilent 4500 Series FTIR equipped with diamond ATR and pesticide library

Value

• Confirm identity of commercial pesticides that are manufactured and distributed internationally
• Prevent crop loss, field contamination and associated health risks to farmers and consumers

Analyze chemicals associated with food production and processing

Need

• Rapidly measure the level of acrylamide formed during frying process with a minimum of sample preparation.
• Alert if levels exceed specification

Location

• In food processing plants producing potato chips and other fried foods

Solution

• Agilent 4500 Series FTIR equipped with diamond ATR and acrylamide calibration method

Value

• Ensure that the level acrylamide, a potential carcinogen, is minimized in the cooking process.

Detect food adulteration

Need
• Determine if milk has been adulterated

Location
• Shipment receiving

Solution
• Agilent 5500 FTIR with DialPath

Value
• Rapidly detect if milk has been diluted
• Screen samples for further analysis of adulterants

<table>
<thead>
<tr>
<th># of milk lots</th>
<th># of samples</th>
<th>Factors</th>
<th>SEC</th>
<th>SECV</th>
<th>SEP</th>
<th>R²cal</th>
<th>R²val</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agilent FTIR (1300 – 950 cm⁻¹)</td>
<td>All adulterants</td>
<td>4</td>
<td>372</td>
<td>4</td>
<td>0.74</td>
<td>0.76</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Application Brief available at:
http://www.chem.agilent.com/Library/applications/59911953EN_AppNote_5500_dialpath_food_milk.pdf
Provide Quality Assessments

Need

- Rapidly measure key analytes that define quality and flavor of tomato juice

Location

- In food processing plants; at farm or field

Solution

- Agilent 4500 Series FTIR equipped with diamond ATR and tomato juice calibration method

Value

- Confirm key analytes are within specification to ensure quality and taste acceptance.
- Support blending operations

<table>
<thead>
<tr>
<th>Tomato Analyte</th>
<th>Spectrometer</th>
<th>Concentration/(pH) Range</th>
<th>SECV</th>
<th>(R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brix</td>
<td>Benchtop</td>
<td>4.40 - 7.50</td>
<td>0.36</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>0.39</td>
<td>0.75</td>
</tr>
<tr>
<td>Fructose</td>
<td>Benchtop</td>
<td>1.37 - 5.70 g/100g</td>
<td>0.32</td>
<td>0.87</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>0.43</td>
<td>0.79</td>
</tr>
<tr>
<td>Glucose</td>
<td>Benchtop</td>
<td>1.03 - 5.75 g/100g</td>
<td>0.43</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>0.49</td>
<td>0.86</td>
</tr>
<tr>
<td>pH</td>
<td>Benchtop</td>
<td>3.90 - 4.76</td>
<td>0.06</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>0.06</td>
<td>0.91</td>
</tr>
<tr>
<td>Titratable Acids</td>
<td>Benchtop</td>
<td>0.27 - 0.88</td>
<td>0.05</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>0.05</td>
<td>0.87</td>
</tr>
<tr>
<td>Citric Acid</td>
<td>Benchtop</td>
<td>256.37 - 2015.93 mg/100g</td>
<td>136.5</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>mobile</td>
<td></td>
<td>123.4</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Mobile FTIR Applications in Progress

Authentication/adulteration
• Verify olive oil is free from adulterating oils
• Determine if vegetable oil is new or recycled
• Verify identity of numerous ingredients in foods
• Measure levels of specific adulterants of milk
• Verify the purity of high value syrups

Quality Assessment
• Screen and measure quality traits in fruit and vegetable juices
• Measure ripeness in fruits and vegetables
• Measure quality of high value edible oils
• Determine alcohol content in wine, spirits, liquors and pre-mixed drinks
• Measure amount of trans fat and free fatty acids

Food Production
• Identify type of fungi infecting crops
• Analyze soil and soil chemistry

As the food industry’s premier measurement company, we will help our customers ensure the safety of the global food supply.
#### Mobile Measurement FTIR Solutions

<table>
<thead>
<tr>
<th>Agilent 5500 Series FTIR</th>
<th>Agilent 4500 Series FTIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 8 lbs</td>
<td>• 15 lbs</td>
</tr>
<tr>
<td>• 8” x 8” x 4.5”</td>
<td>• 8” x 11.5” x 7.5”</td>
</tr>
<tr>
<td>• External Computer</td>
<td>• Integrated PDA computer</td>
</tr>
<tr>
<td>• External Power</td>
<td>• Battery powered</td>
</tr>
<tr>
<td>• For fixed, on-site labs or mobile labs</td>
<td>• Fully portable for use at field, farm, shipping, receiving and food processing sites</td>
</tr>
<tr>
<td>• Measures liquid and solid samples</td>
<td>• Measure liquid and solid samples</td>
</tr>
</tbody>
</table>

*Agilent portable FTIR systems are designed and built for demanding environments. These state-of-the-art, proven systems have class-leading performance and unmatched ruggedness.*
Agilent’s Innovative Sample Technology speeds the analysis of food and food ingredients

Dialpath 3 wavelengths

**Step one**

**DialPath** – for simplified quantitative analysis of liquid samples with varied analyte levels

**Step two**

**Diamond ATR** – for rapid identification of solid and liquid samples. Heated ATR available for analysis of semi-solid fats

**Step three**
Agilent FTIR Software is Designed for Routine Operation and Reliable Answers

• **Intuitive**, pictorial interface guides user through sample introduction, analysis and cleanup

• **Real-time analysis** mode shows user that sample is properly positioned in sample interface

• **Click a button** to use pre-loaded and pre-calibrated methods for quantitative analysis.

• **Confirm identity and composition** of food and food ingredients by comparison to an on-board library. Results and quality of results are displayed.

• **Color-coded alerts** inform when an analyte is above a critical threshold (red), approaching threshold (yellow) or within specification (green)

• **Automated diagnostics** ensures operational readiness and performance
Mobile FTIR analyzers are now available from Agilent, enabling you to ensure the identify, authenticity and purity of food ingredients and food products – in the field, at the loading dock or at on-site processing facilities. No more waiting for results from a remote lab - make actionable, on-the-spot decisions. Keep inferior ingredients from entering production and make sure that final products are of the highest quality.

- **Authenticate** food ingredients
- **Analyze** chemicals associated with food production and processing
- **Detect** food adulteration
- **Provide** quality assessments

Please contact us to discuss your specific needs. *Get lab quality results where and when you need them... with mobile FTIR analyzers from Agilent.*
Only Agilent has the chemical and biological technology/measurement capabilities to support a comprehensive food safety program.

Only Agilent is prepared to put time, money, and talent toward finding and developing new food safety applications.

Only Agilent has created a collaborative process for meeting current and future food safety challenges.