

InfraSpec Variable Filter Array (VFA) IR Spectrometer

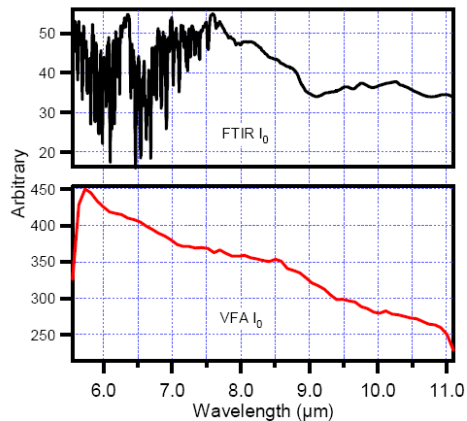
A New Concept in Infrared Instrumentation



The InfraSpec VFA-IR Spectrometer is a rugged, portable and low cost mid-infrared (mid-IR) spectrometer that provides quantitative or qualitative results in less than one minute.

- Rugged design: no moving parts
- No exposed air path
- Water and chemical resistant enclosure
- Provides spectral data on a wide variety of samples
- Ideal for process monitoring (PAT), Q.C., materials verification, environmental testing
- Simple user interface
- Compact and Portable

On-Site IR Analysis is Now Easier and More Useful Than Ever



*One meter + optical path of an FT-IR (top)
vs. no air path in an InfraSpec VFA-IR
Spectrometer (bottom)*

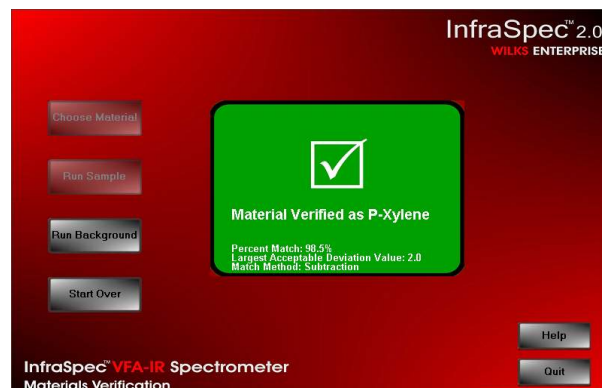
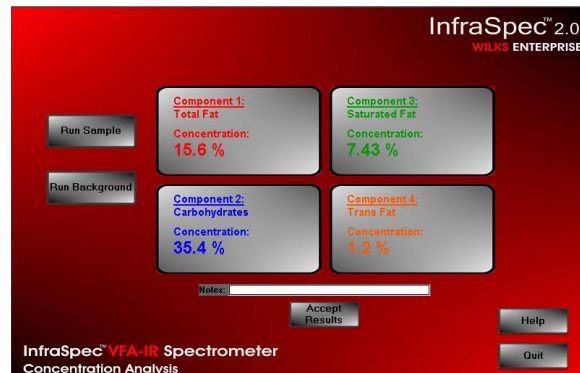
The InfraSpec Variable Filter Array (VFA) IR Spectrometer is a new concept instrument that enables the user to obtain infrared spectra on a variety of materials wherever they occur—in the production plant, in the field or in the lab. The new InfraSpec VFA-IR Spectrometer utilizes a patented design consisting of an ATR sample plate with an elongated, pulsable source mounted to one end and a linear variable filter (LVF) and detector array mounted close to the other. The net result is a very compact spectrometer with no moving parts, no optical path exposed to air and capable of producing mid IR spectra on liquids, films, slurries, powders, semi-solids and solid surfaces. The detector array has 128 elements giving an approximate 25 wave number resolution in the mid-IR. A transmission variable filter array is also available for sealed cells, cuvettes, or card readers.

The InfraSpec VFA-IR Spectrometer is operated by user friendly software. In addition to generating spectra, the program options include the ability to create calibration tables for quantitative analysis and to build libraries for materials verification. Partial least squares (PLS) regression calibrations are also supported. A simplified interface makes analysis easy for non-technically trained personnel. It is the ideal choice for supplementing the capabilities of FT-IR spectrometers in areas where it is not practical or cost effective to utilize such sophisticated and costly instrumentation.

Application Versatility for Laboratory, Field or At/Near Line Use

Quantitative Analysis

The mid IR is the ideal spectral region for quantifying key components in a product. Examples from the food industry are alcohol measurement in beverages, trans-fatty acid in vegetable oils or % total fat.

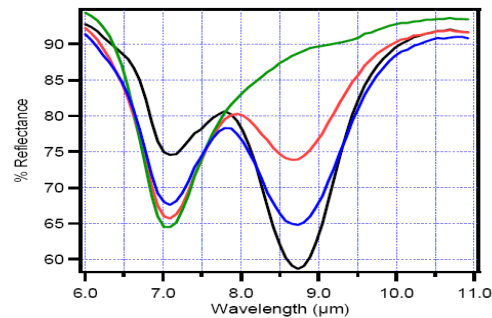


Materials Verification

An important use of mid-IR spectral data has been to identify materials. The rugged and portable InfraSpec VFA-IR Spectrometer is well suited for this application because it can be placed at the receiving dock or in the production area. Spectra of materials can be stored in the InfraSpec software program. Materials can be verified in minutes by in-plant personnel with a simple pass/fail screen

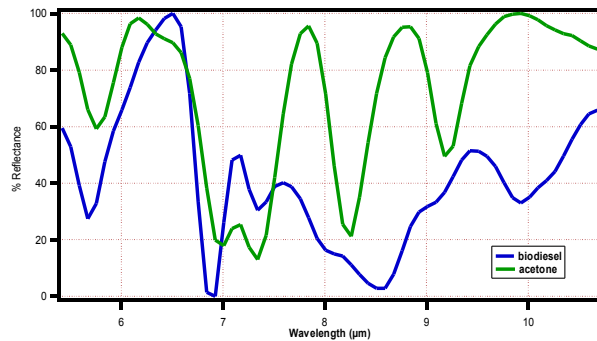
Following Reactions, Materials Aging

Using a repetitive scan program, changes in spectral information can be used for such applications as following a processing operation or determining the effects of extended usage of materials. In the case shown, a decrease in inhibitor level leads to an increased contaminate concentration. Reaction monitoring is also key in pharmaceutical applications for PAT.



Changing stream composition indicated by repetitive scanning

Research Applications



Typical InfraSpec Spectra

For research laboratories or universities, the InfraSpec VFA-IR Spectrometer is a low-cost alternative to an FT-IR. Its rugged design contains no moving parts and a water/chemical resistant case. It is relatively unaffected by environmental changes since there is no exposed air path. These features make it ideal for on-site analysis as a dedicated spectrometer for research projects.

InfraSpec VFA-IR Applications for Qualitative or Quantitative Analysis

Food Analysis

- Alcohol in wine/beverages
- % trans fatty acid
- % total fat in food
- Glucose in water/soft drinks
- Distillery grain analysis

Fuel Related Analysis

- % Biodiesel in diesel
- % Ethanol in gasoline
- Biodiesel total glycerol
- Oil analysis/additive measurement
- Oil degradation

Polymer Industry

- Flexible film analysis
- multilayer film analysis
- Raw materials verification

Energy Industry

- Water in D₂O
- D₂O in water

Environmental Testing

- Solvents in water
- Oil in vertrel
- Isocyanates

Chemical Industry

- Materials verification
- Reaction monitoring
- Water in solvent

Pharmaceutical

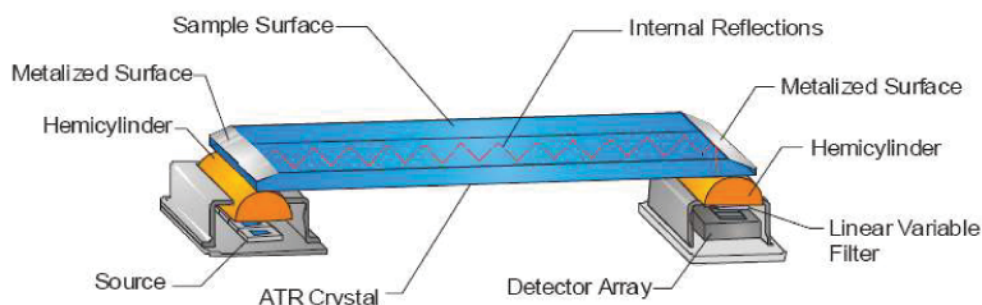
- Process monitoring (PAT)
- Powder analysis

University Research

Other

- Household products
- Gemstone identification
- Nitrates in soil
- Custom applications

InfraSpec Variable Filter Array (VFA) IR Spectrometer Specifications



Internal View of the InfraSpec VFA-IR Spectrometer (ATR version)

Dimensions	1.2" x 4.25" x 6.5", 16.5 x 11 x 4 cm
Weight	3.5 lbs., 1.5 kg
Computer Connections	RS-232, USB
Computer Requirements	Windows 2000, XP
Power Requirements	12V DC, 2.0 amps
Power Supply	Universal AC/DC converter (supplied as standard)
Suggested Temperature Operating Range	15°C - 60°C
Humidity	0 – 98% relative humidity (non-condensing)
Detector Array	128 Pixel linear pyroelectric array
Sample Stage Options	ATR(Attenuated Total Reflection) or Transmission
Standard Spectral Ranges	2.5-5 μm (4000-2000 cm^{-1}), 5.5-11 μm (1850-925 cm^{-1}) 7-14 μm (1430-710 cm^{-1})
Spectral Resolution	25 cm^{-1}
ATR Crystal Material	Zinc Selenide(standard), Cubic Zirconia, Zinc Sulfide
ATR Surface Size	50 x 16 mm
# of ATR Reflections	10