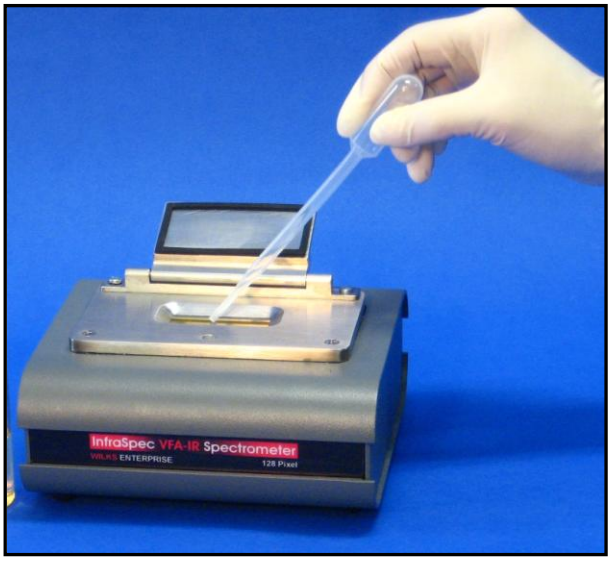
Alcohol Measurement in Beverages

Introduction:



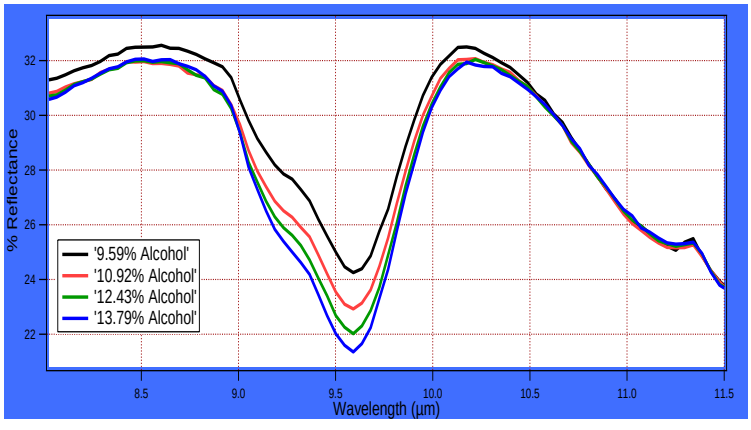
Alcohol measurements tend to be either time consuming (gas chromatography) or inaccurate (ebulliometer). Infrared offers a quick and accurate method of analysis. Mid infrared (Mid-IR) offers distinct absorbance bands without the overtones found in the NIR range. Mid-IR also allow for the use of an ATR (Attenuated Total Reflection) sample stage as shown in the picture on the left. The exposed crystal makes sample presentation and cleaning quick and easy. Another consideration in small winery laboratories is size. The InfraSpec VFA-IR Spectrometer is a compact, rugged and portable solution for alcohol measurement in beverages at a fraction of the cost of an FTIR.

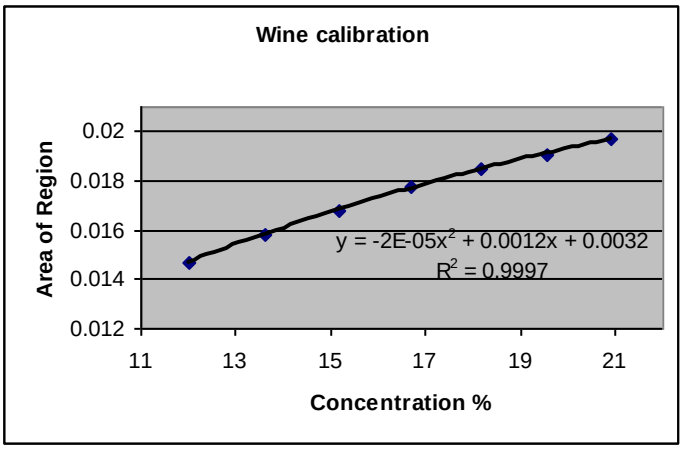
Operating Principle:

The InfraSpec VFA-IR Spectrometer is a new concept in infrared instrumentation. It utilizes a patented design consisting of an ATR sample plate with an electronically modulated source on one end and a linear variable filter (LVF) and a 128 pixel detector array on the other. The result is an infrared analyzer that, unlike an FTIR spectrometer, has no moving parts and an insignificant optical air path. This makes for a portable, rugged analyzer suitable for use in a field environment. The peak for ethanol is located at 9.6 µm (1042 cm^{-1}), therefore a 5.4-10.8 µm (1850-925 cm^{-1}) filter is used. Measuring the change of absorbance at the wavelength specific to ethanol determines the % alcohol.

Analysis:

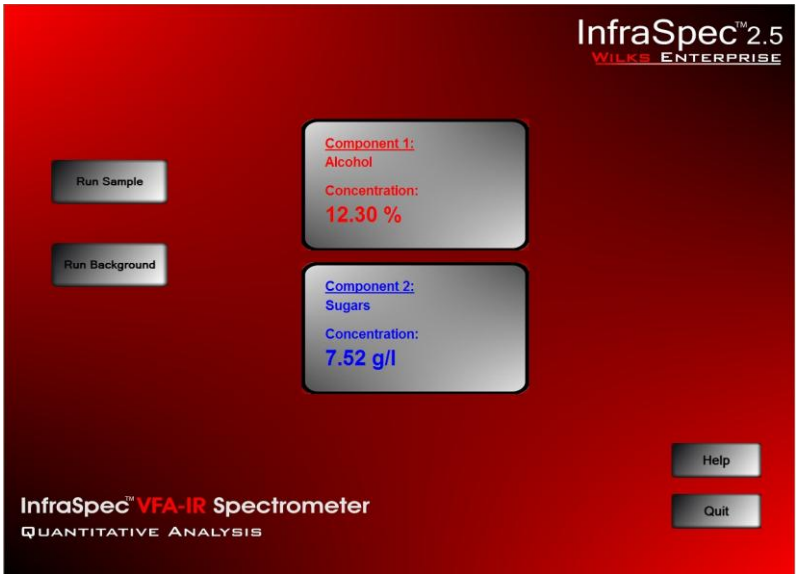
Results for a Mid-IR analysis of alcohol in beverages is comparable to distillation, GC, NIR and ebulliometer measurements. The range is 2-95% with an accuracy of ±0.15% v/v alcohol. Less than 1 ml is needed for analysis. A sample is placed on the exposed sample plate and the run button is selected. In less than a minute the result is displayed. The sample is cleaned off with a wipe and the analyzer is ready for the next sample.





A calibration table as shown on the left can be created and stored in the InfraSpec VFA-IR software. A PLS calibration can also be created according to ASTM Method E 1655-05.

With an internal calibration table, the interface for the operator in the production area is greatly simplified. If desired, a barcode scanner can identify the sample and the results can be accessed electronically from a remote laboratory. Spectra are also stored in the program for laboratory personnel to review.



Specifications:

Dimensions	**6.0" x 6.5" x 2.75", 15.2 x 16.5 x 7cm**
Weight	**3.5 lbs., 1.5 kg**
P.C. Interface	**RS 232 or USB**
Power Requirements	**12V DC, 2.0 amps**
Power Supply	**Universal AC/DC converter type (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**
Array Responsivity	**5.4-10^5 V/W**
Spectral Ranges	**5.4-10.8 (1850-925 cm^{-1})**
For InfraSpec VFA-IR Spectrometer ATR Sample Plate	
ATR Crystal Material	**Zinc Selenide**
ATR Surface Size	**50 x 16 mm**
# of Reflections	**10**
Resolution	**25 cm^{-1}**

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