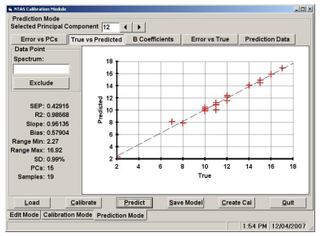
NIR Chemometrics Software

NTAS(NIR Technology Analysis Software) is a complete suite of spectral analysis and calibration routines for use with the MultiScan Series of NIR Analyser

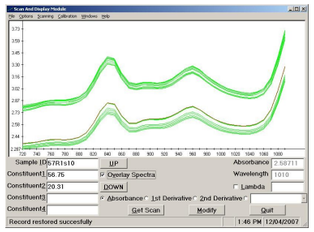
Calibration

NTAS provides a comprehensive calibration routine using Partial Least Squares (PLS) Regression. Samples can be scanned and saved using the Scan and Display routine. The reference values can be added to the spectral files using the Edit feature. Then the calibration spectral file can be imported into the Calibration Creation routine. A few simple keystrokes and a PLS model can be created and saved. Up to four models can be developed and saved in the one product file.



Analysis

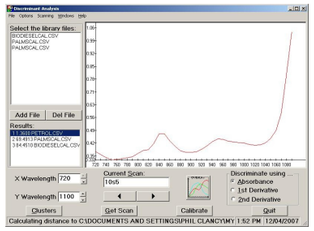
To make an analysis, the operator simply selects the Product from the in built LCD screen and all parameters are automatically applied. There is no need for the operator to make decisions on parameters and settings. An analysis takes approximately 60 seconds and the results are displayed on the analyser's screen.



Alternatively the Series 3000 Food Analyser can be operated directly from NTAS using a PC. The Analysis program in NTAS allows the operator to connect to the analyser and thereby control the instrument's operation. Simply select the Product from the memory and perform an analysis by following the screen prompts. The results of up to four components are displayed on the screen in either a Trend Plot or a Table of Results. Results can be stored in memory for later reporting or further analysis.

Discriminant Analysis

NTAS also provides a Library Search routine called "Discriminant Analysis". A set of spectra files for a wide range of materials, e.g., raw materials used in a food or a pharmaceutical manufacturer, are stored in memory as a library file. Incoming or unknown materials can be scanned quickly and identified based on their spectrum. This technique does not require any calibration and provides a rapid means of ensuring that the material is the "Same As" described on the label and the "Same As" last batch. The Discriminant Analysis routine uses Mahalanobis Distance between spectra to match a test sample to the closest library file.



Specification	Series 3000 Food Analyser
Wavelength Range	720-1100nm
Opics/Detector	Spectrograph/Silicon Diode Array
Lamp	Tungsten Halogen 12VDC, 20W
Scan Rate	3.6 secs per scan
Resolution	10nm
Display	Touch Screen PC
Power	19VDC using 110 –240VAC
Dimensions (cm) Weight (Kg)	40 W x 40 D x 35 H 18Kg

MultiScan

Series 3000
Food Analyser

The Next Generation of Near Infrared Analysers

Manufactured by:

NIR Technology Systems

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Distributed by:

NIR Technology Systems

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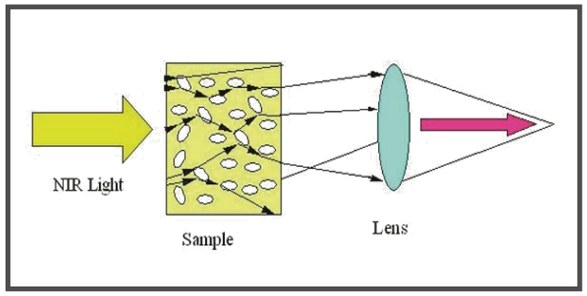
Near Infrared Spectroscopy

In the Near Infrared spectral region, 720 to 1100nm, chemical bonds such Carbon-Hydrogen, Oxygen-Hydrogen and Nitrogen-Hydrogen absorb light when it is passed through or reflected off a sample. The amount of light that is absorbed by these chemical bonds is proportional to the concentration of the chemical compounds containing C-H, O-H and N-H bonds. Compounds such as protein (N-H), Fats and Oils (C-H), Sugars , Alcohols and Water (O-H) can be measured in slurries, emulsions, granules, liquids and powders. As such, NIR spectroscopy is an excellent analytical technique for measuring a broad range of foods and food ingredients.

Near Infrared Transmission and Transflectance. (NIT)

The schematic below shows the optical configuration of the Series 1000, 2000 and 3000 NIT Analysers. Light from a tungsten halogen lamp passes through a sample cell containing liquids, slurries or solids. The light interacts with the C-H, O-H and N-H bonds in the sample where some of the light is absorbed.

The light that passes through the sample is focused onto the entrance slit of the spectrograph which uses a stationary diffraction grating to



separate the light into the frequency domain. The diffracted light is directed onto a silicon photodiode array detector where the intensity of the light is measured at each frequency. The intensity is related to the concentration of the chemical component that absorbs at that frequency. A calibration model uses this data to compute the concentration of compounds in the sample.

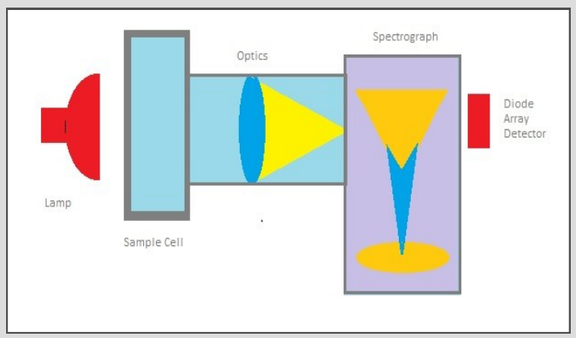
For materials that are clear, the light passes through the sample without deviation. This technique is classical Transmission spectroscopy. For

materials that are granular, ie, grains, pellets, crystals, or have a high solids to water content, ie, slurries, pastes or emulsions, the light actually passes through the material by internal reflectance off the solid particles and through the liquid phase. This is referred to as Transflectance, ie, a combination of reflectance and transmission. For samples with high water content, transflectance offers the advantage in that the NIT spectrum represents the whole of the sample not just the surface.

How the MultiScan S3000 Food Analyser work.

The MultiScan series of analysers consist of the following components; Lamp, Sample Compartment, Optics, Detector. Light from the lamp, passes through a sample of grains or oil seeds. The light bounces off the surfaces of the grains or oil seeds and propagates through the sample until it reaches the other side. The emerging light is focused into the slit of a flat field spectrograph that separates the light into its individual frequencies, across the wavelength range from 720-1100nm. The separated light is then directed onto a silicon photo diode array detector. This array detector measures the intensity of the light at each frequency to produce what is called the NIT spectrum of the sample.

Within this region of the electromagnetic spectrum, N-H (protein), C-H (fats and oils) and O-H (water) and C-O-H (carbohydrates) absorb NIR light at specific wavelengths. The NIT spectrum contains information about the concentration of these components. A calibration model, stored in the analyser's memory, converts this information to % concentration for each component.



Series 3000 Food Analyser

The Series 3000 Food Analyser is a NIR spectrometer designed to measure protein, fat, water, sugar, alcohol and other compounds in foods. The key to the Series 3000 Food Analyser is the sample draw that provides a means of analysing a wide range of materials, ie, granules, powders, liquids, slurries, emulsions, films and solids.

The rotating sample drawer provides a means of collecting Near Infrared Transmission (NIT) spectra over a wide area and then averaging the spectra to give more accurate results.

Applications for the Series 3000 Food Analyser include;

Raw and Processed Meat

- Fat, Moisture and Protein in Sausage and Salami Mix.
- Fat, Moisture, Protein and Chemical Lean in Raw Meat including Beef, Pork, Lamb, Chicken.

Dairy Products

- Fat, SNF, Protein and Lactose in Whole Milk, Cream and Skim.
- Fat, Protein and Moisture in Milk Powder
- Fat and Moisture in Cheese, Yogurt, Butter and Cream Cheese.

Baked Goods

- Fat and Moisture in Whole Cookies
- Fat, Moisture and Sugar in Dough

Fruit and Vegetables

- Water, Fat, Protein and Starch Content in Whole Fresh and Cooked Vegetables.
- Moisture in Dried Fruits and Vegetables.
- Fat and Moisture in Pre-Cooked Vegetables.

Confectionery and Chocolate

- Moisture and Protein in jubes, jellies and soft lollies.
- Fat and Moisture in chocolate
- Fat and Moisture in nougat, creams and foundants.