

Application Note 86: Whole Tablet Spectra: Series 2000 Near Transmission Analyser



Introduction:

The measurement of components in whole tablets is of interest to the pharmaceutical industry for two reasons; 1) tablet uniformity analyses and 2) counterfeit tablets.

The Series 2000 Near Infrared Transmission Analyser is a powerful NIT spectrometer based on a diode array optics system. Until now this analyser has been used mainly for dairy, meat and alcohol measurements. However the exceptionally wide dynamic range, 0 to 6 absorbance units or 100% to 0.0001% transmittance, makes the instrument suitable for measuring right through whole tablets. Using a simple sample holder, it is shown in this report that whole tablets can be scanned and therefore analysed for moisture, active ingredients and fillers, as well identification for counterfeit detection.

Description:

Whole tablets were collected from local drug stores and pharmacies. A tablet was placed onto an aluminium plate using blue tack. The aluminium plate had a 5mm diameter hole in the centre. The plate was placed into a sample cell that is normally used for holding liquid cuvettes. The plate obscured the light from passing through to the detector except through the hole in the centre. By placing the tablet over the hole, only light passing through the tablet was used to collect a scan.

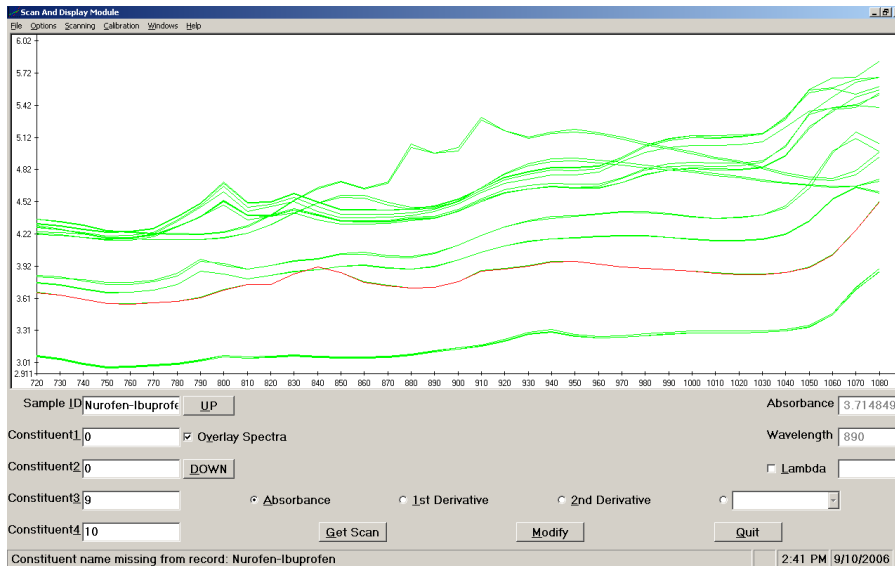
Each tablet was scanned twice using NTAS(NIR Technology Analysis Software) and in most cases two separate tablets were fitted to the plate and scanned twice to produce four scans. The spectra were collected from 720 to 1100nm at 10nm data resolution.

The tablets included:

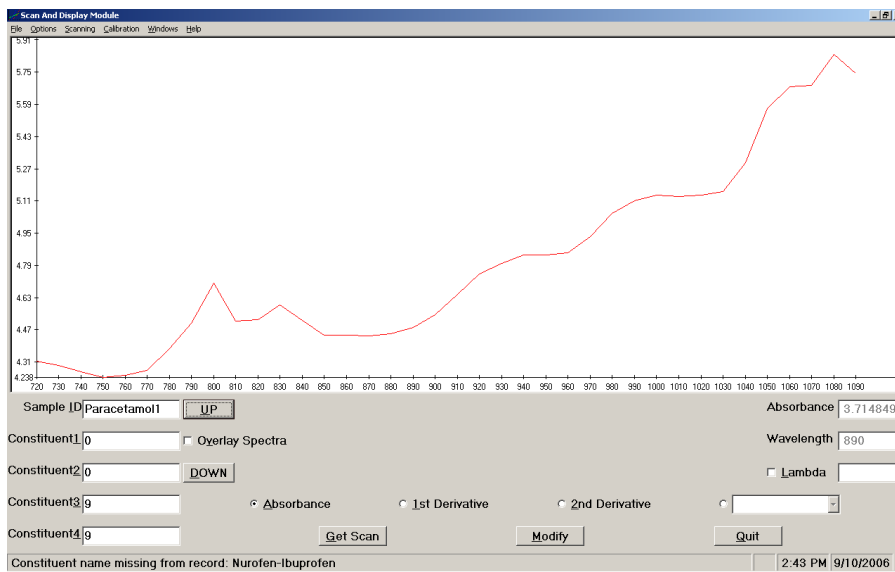
- Generic Paracetamol (High strength paracetamol. 500mg per tablet)
- Sanofi Synthelabo Panamax (High strength paracetamol. 500mg per tablet)
- Generic Aspirin (300mg per tablet)
- Roche Aspro Clear (Soluble tablets 300mg per tablet)
- Pfizer Mylanta
- Vita Gold Products Calcium Gluconate
- Nurofen Ibuprofen Tablets (Coated 200mg per tablet)

Data:

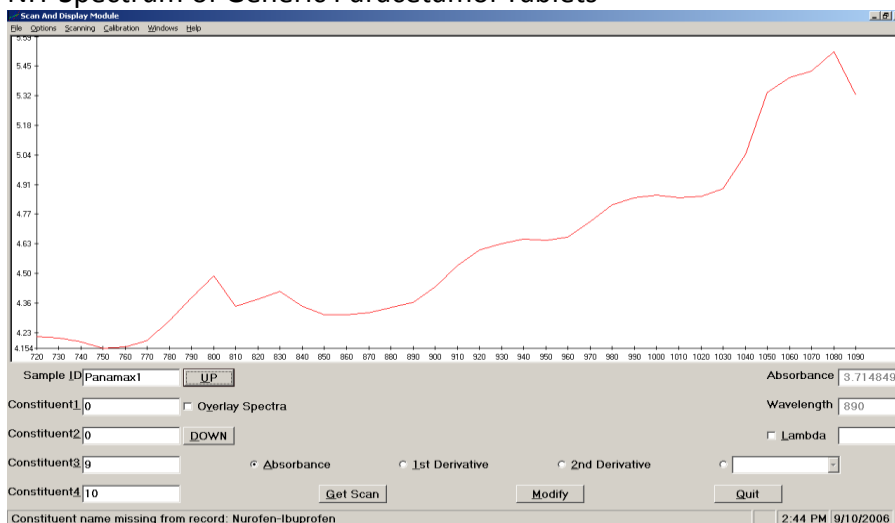
The spectral plots below show all the tablet spectra and then the individual spectrum.



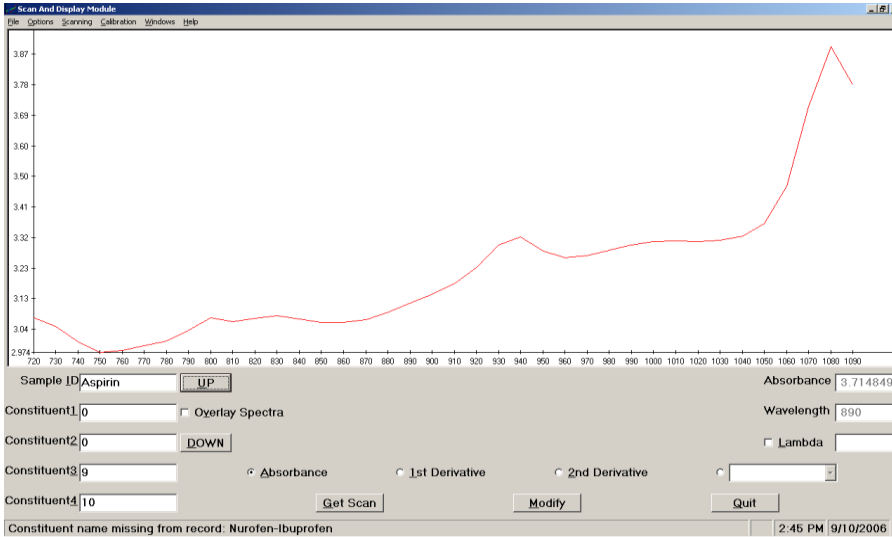
NIT Spectra of 7 Different tablet Types



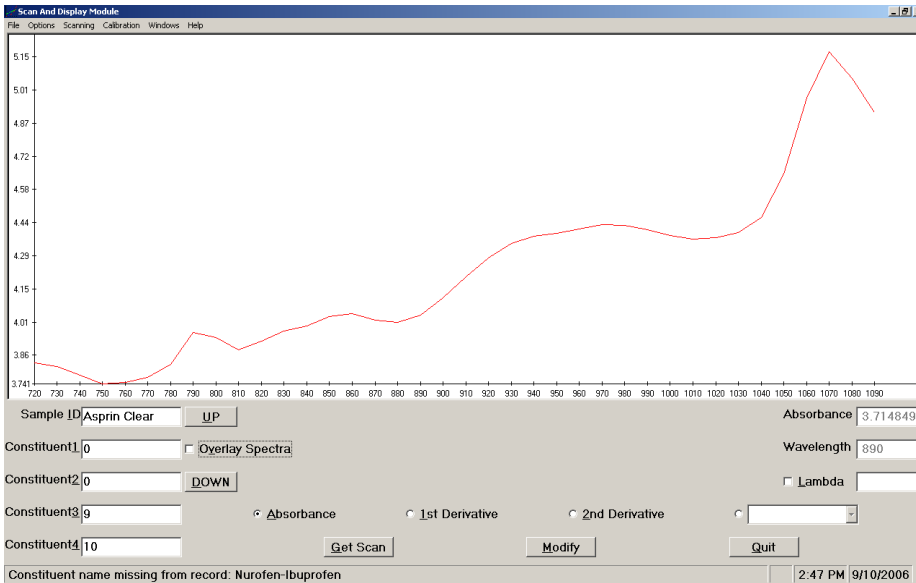
NIT Spectrum of Generic Paracetamol Tablets



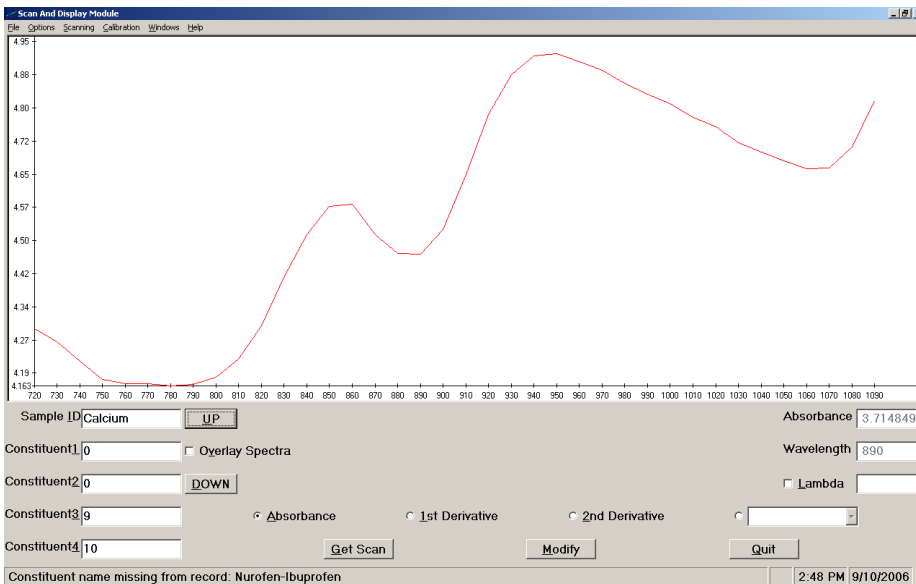
NIT Spectrum of Panamax Tablets – Sanofi Synthelabo brand



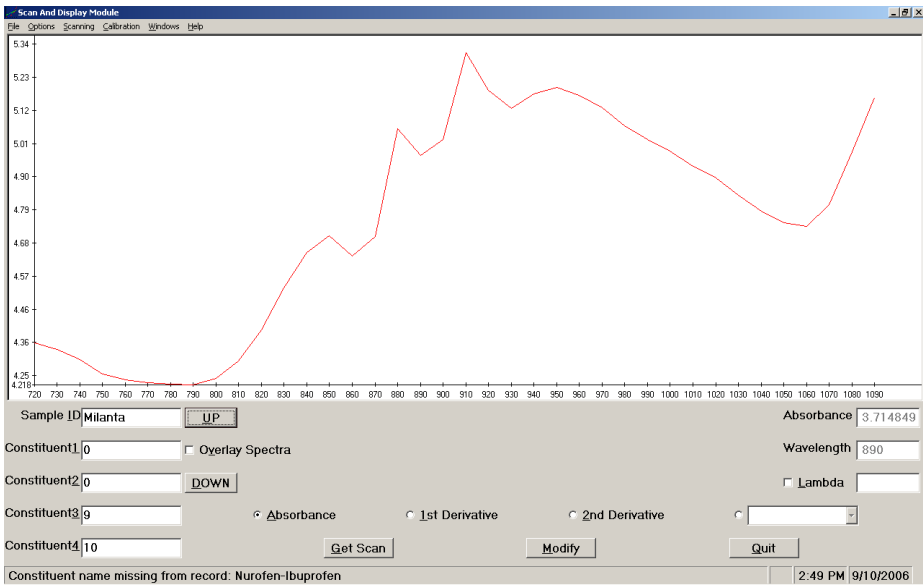
NIT Spectrum of Generic Aspirin – Solid Form



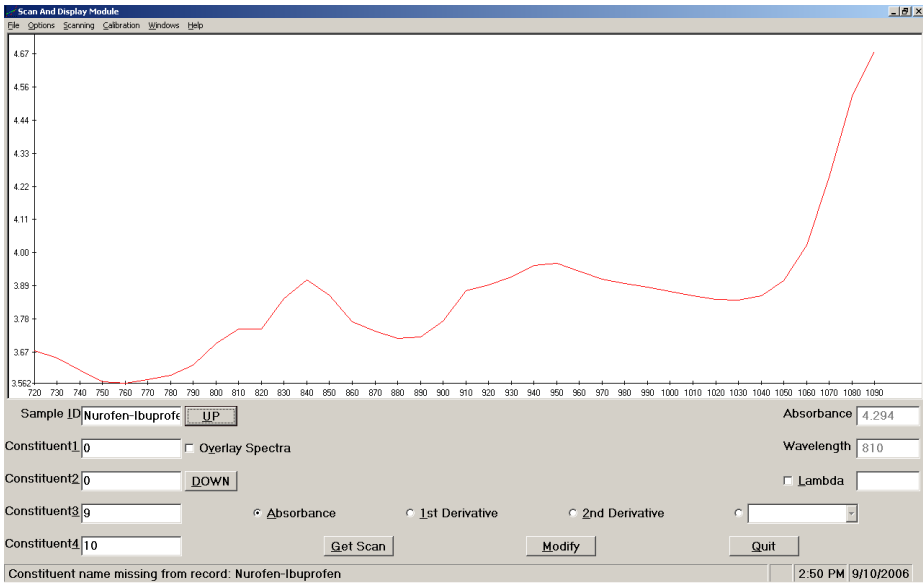
NIT Spectrum of Aspro Clear: Roche brand.



NIT Spectrum of Calcium Gluconate Tablets: Vita Gold Products brand

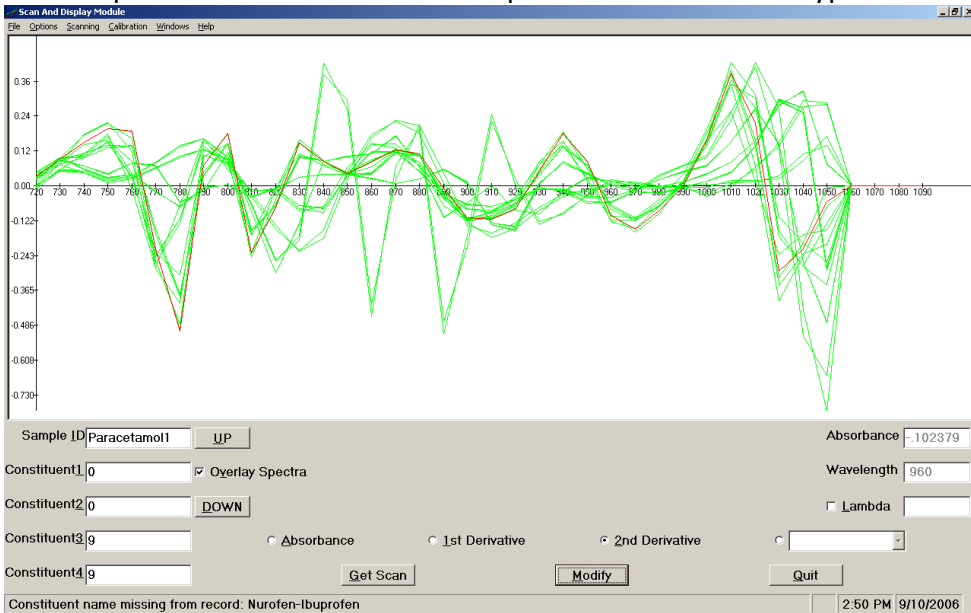


NIT Spectrum of Mylanta Tablets: Pfizer



NIT Spectrum of Ibuprofen Tablets: Nurofen brand

The last plot shows the 2nd derivative spectra of all the tablet types.



2nd Derivative NIT Spectra of Whole Tablets

Discussion:

The purpose of this study is to demonstrate that the Series 2000 Near Infrared Transmission Analyser is capable of measuring through whole tablets. The second purpose is to demonstrate that the NIT spectra of these tablets are significantly different to each other. The 2nd derivative spectra illustrate these differences since the spectra are normalised to the same base line and the small peaks are resolved.

Based on these spectra, it is suggested that the Series 2000 could be used effectively to make tablet uniformity measurements quickly. A special sample cell could be developed to hold 10 tablets at once and to sequentially place the tablets in the light beam and collect separate spectra for each tablet. The Series 2000 includes a mechanical sample transport module to collect up to fifteen different portions of a sample, eg, cheese or meat. This same mechanism could be used to position the tablets in front of the light beam and thereby collect the individual spectrum for each tablet.

The differences between the spectra are consistent between repeated scans and as such the spectra could be used to identify the authenticity of a tablet or to detect counterfeit tablets.

The system could also be used to identify illegal drugs, which are in tablet form.