In-line Analysis of the concentration of flavoured mineral waters

INTRODUCTION

For a few years now mineral waters have been flavoured with additives in order to modify the taste.
These additives, the likes of "Lemon" for Mineral Waters, are dissolved in alcohol and are added to the mineral water in strongly diluted form (approx. 1:1000). The desired concentration is determined by subjective "tasting" and then released to the filling facilities. An evaluation of samples taken before and during the filling process can provide objective measures of the concentration of the additives in the final product.
Chemical tests on production samples represented another approach to the problem.
In-line monitoring of the current concentration of the additives in the production stream by means of immersion probes or flow-though cells provides the possibility of direct process control. Thus it is possible to increase the continuity of the concentration in the final products.

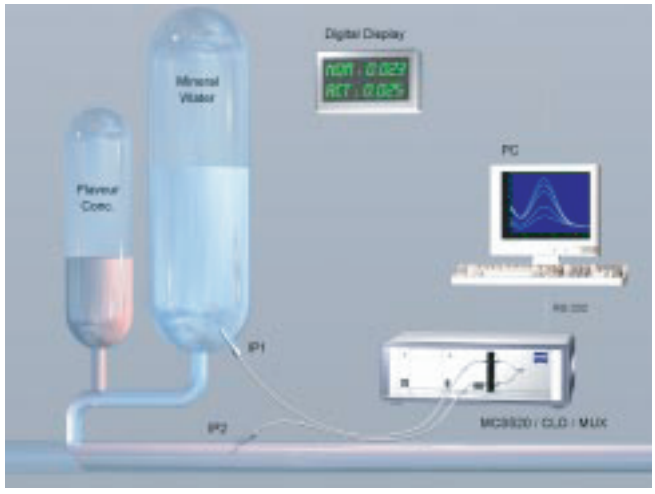

Figure 1: In-line monitoring

THE METHOD

The concentrated flavour additives dissolved in alcohol generate typical absorbance in the UV spectral range. The example shows a real sample (mineral water 'lemon') and a dilution series of this sample. (Figure 2)
A tolerance window is specified to enable the process control adjustment of the added concentration.

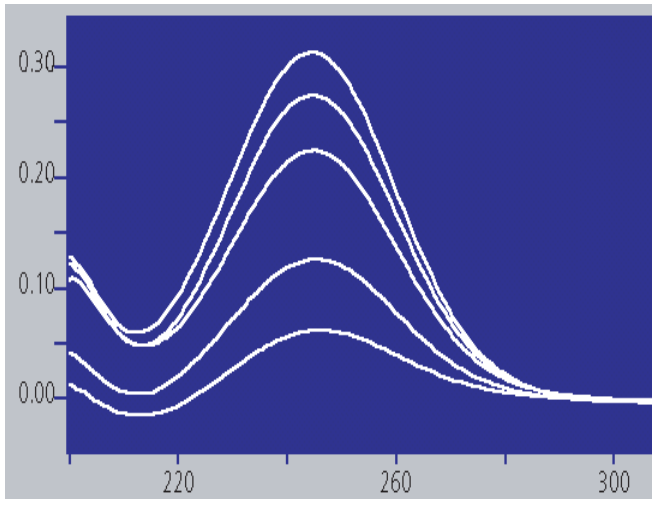

Figure 2: Sample

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THE SYSTEM

The diode-array spectrometer system MCS551UV based on the established Zeiss MCS polychromator technology provides spectral information in the UV range with a resolution of 0.8 nm / pixel.
The system is controlled by a PC, different interface types (RS422, 4-20 mA loops or trigger I/O ports) can be applied. Systems can be cascaded and controlled via one host PC to take measurements in different streams.

THE SOFTWARE

The DM1 software (LabView generated) runs under Windows NT. The process monitoring programme provides a results display of up to 4 measuring channels. The concentration of the additives in the stream can be displayed as digital readouts of the current values and/or in form of trend charts. Storage of the results and data transfer via an analog output are possible.
Digitally controlled devices like e.g. valves or shutters used to switch product or reference streams can be included in the automated signal processing.

THE BENEFITS

- Fast and continuous measurement
- Short analysis and response time
- Established and proved system and method
- High reliability, low maintenance
- Easy to use software
- Detailed spectral information available at high speed
- Fibre optics allow flexibility in installation and location of the system

SYSTEM SPECIFICATIONS

Wavelength range	200-620 nm (optional 190-1020nm and/or 900-1700 nm)
Wavelength resolution	0.8 nm/diode (2.4 nm Rayleigh)
Wavelength reproducibility	< 0.005 nm
PC interface	RS 422
Distance between PC and system	up to 80m with standard cable up to 2500m with waveguide transmission
Analog output (4-20 mA)	4 channels (standard)
Optical fibres	quartz, 600 µm core, SMA connector Max. distance 10 m
Housing	19” rack 19” protective housing

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