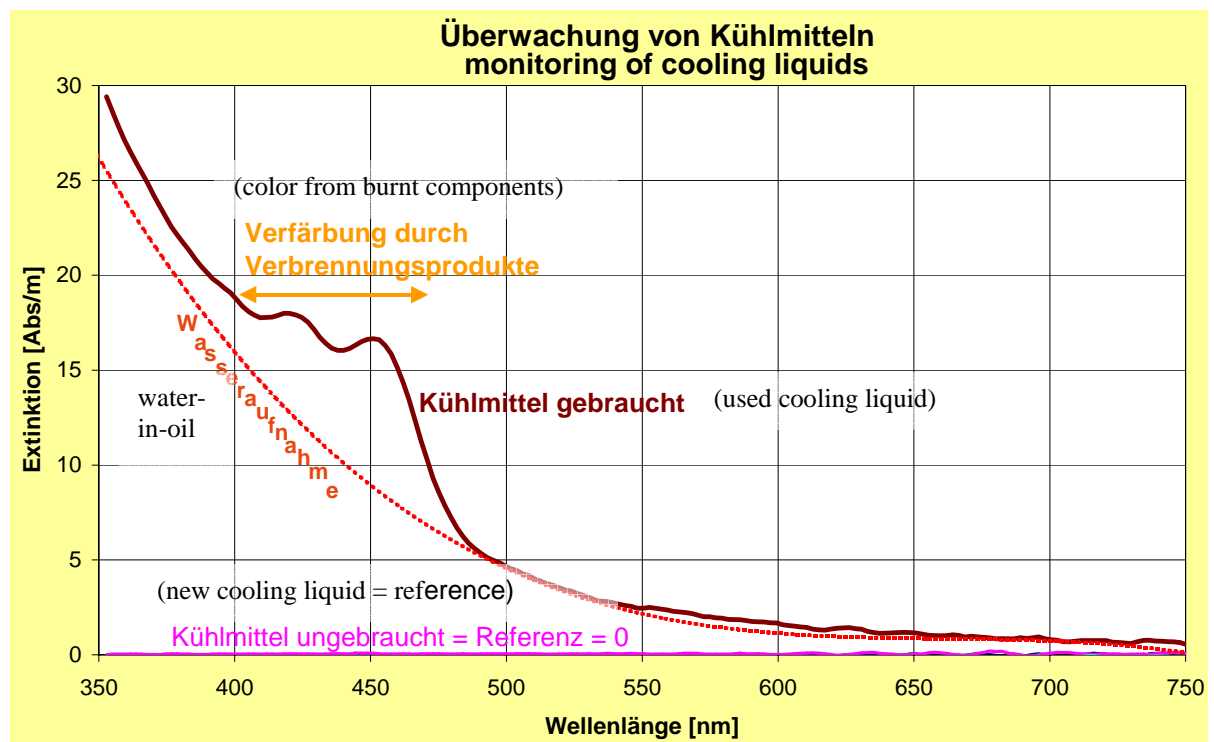


www.s-can.at, office@s-can.at

industrial applications (process and waste water)

Monitoring of Cooling Liquids / Oils

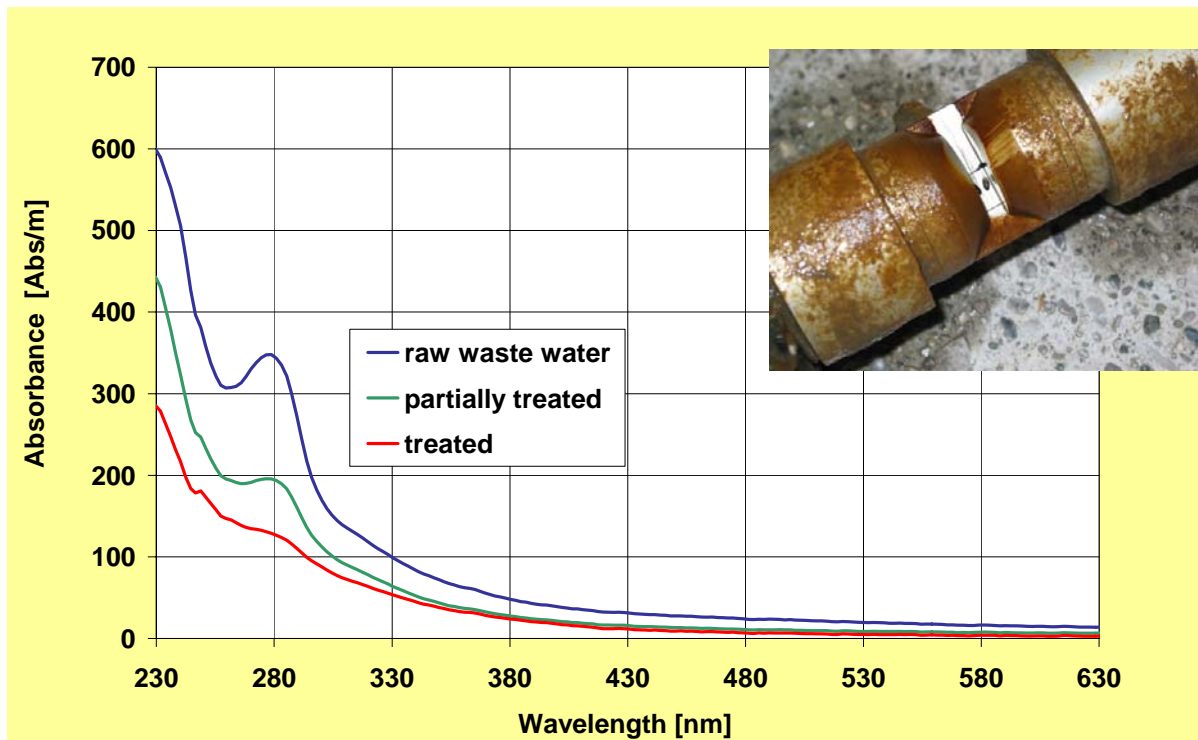
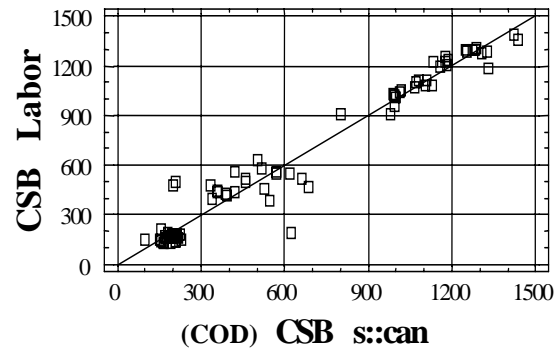
- The fresh coolant is set as a reference spectrum = 0; changes become spectrally visible through water diffusion / de-emulsification / as well as combustion products / colour.
- Measurement has a true resolution of > 1:100; thus, the degree of change can be given with sufficient precision (accuracy) in %.
- No substance concentrations are calibrated, since classic parameters cannot describe the processes involved with the same sensitivity and selectivity.
- Sudden deviations from the reference spectrum can be applied as a very sensitive, broadband alarm parameter.
- Application was successfully tested for
 - transformer oil and for an
 - automobile factory.



Monitoring and Control of a Paper Mill WWTP

- The chart below depicts typical and reproducible spectra at various process measuring points of a paper mill WWTP.
- The spectra increase steadily with decreasing wavelength, which is characteristic of the influence of undissolved particles ($f = 0$). Only the relative maximum at 280 nm is distinct from the influence of the turbid substances, due to the absorbance by dissolved organic substances, mainly ligninic acids. This shoulder is caused by carbon compounds which, from the biological point of view, can be accessed relatively easily. Comparison of absorbance spectra of inflow, pre-treatment and outflow distinctly shows the decrease of this peak, indicating the biological degradation of the organic substances in the course of the treatment and, following local calibration, allowing clear differentiation between COD and BSB5.
- In general, however, the plant can best be controlled without calibration to conventional parameters, merely on the basis of overall spectral information. Conventional calibrations are now merely carried out for purposes of reference-checking the instrument.
- Experience has shown that a parameter describing the dissolved organic substances is particularly suitable for operation and/or control of the treatment performance of a plant.
- This important information can only be gained from spectral measurements. This waste water cannot be well monitored by a simple UV probe, since the SAC254 does not strongly correlate with the degradable carbon.

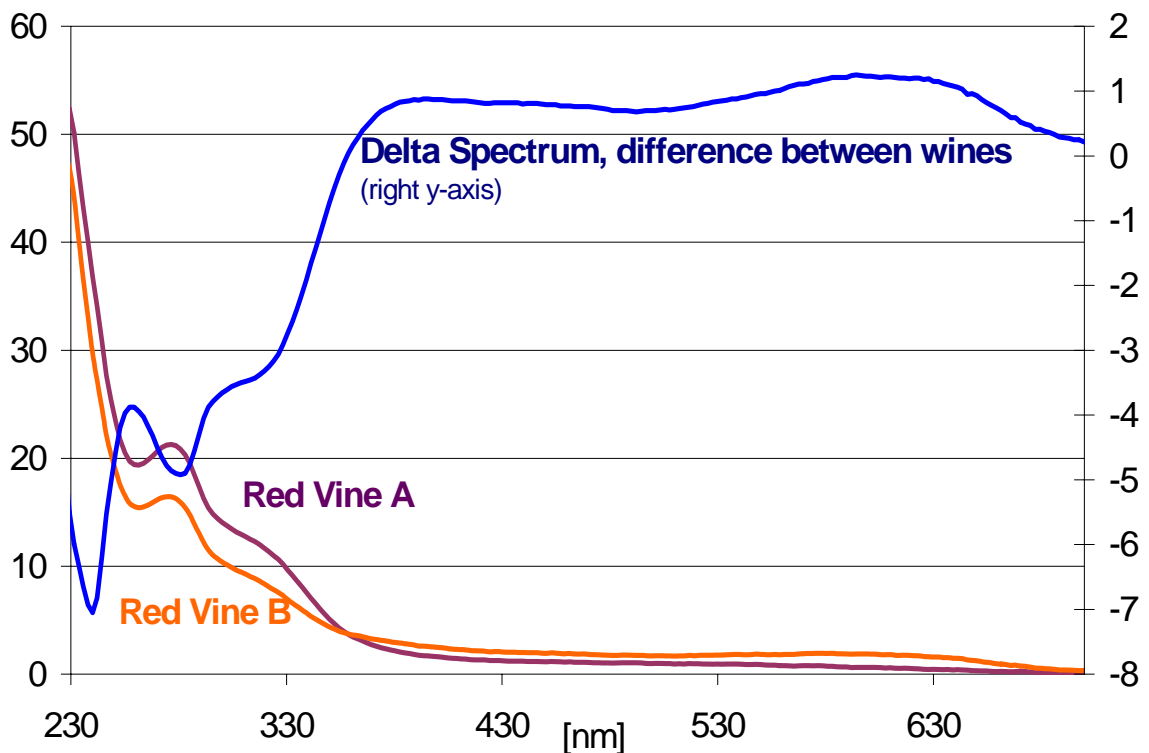
additional literature: F.M. Muzio et al.: "BOD5 Estimation for Pulp and Paper Mill Effluent Using UV Absorbance" Water Research Vol. 35, No.7, pp.1842-1850, 2001



Beverage Industries:

Comparison of Two Types of Red Wine (from the same Italian area)

- In this figure, the individual substance groups which characterise wines can be distinguished in the spectrum or delta spectrum, respectively:
 - 1) Coloration in the visible range: red coloration (shoulder at 620 nm), as well as the yellow/brown coloration (broad shoulder or valley at ca. 500 nm) can be recognised, which can already exceed visual checking at this stage.
 - 2) Organic acids, tannins, etc. between 280 and 350 nm . . . the substance groups which are said to be primarily responsible for the taste.
 - 3) Alcohols, other fermentation products, aromates, between 230 and 280 nm.
 - It can be anticipated from the results that, with the help of this method, the quality of wines - and as well other alcoholic or non-alcoholic beverages - can be checked and distinguished in process.
 - Deviations from a target status can be detected and used i.e. for product quality surveillance or for blending.

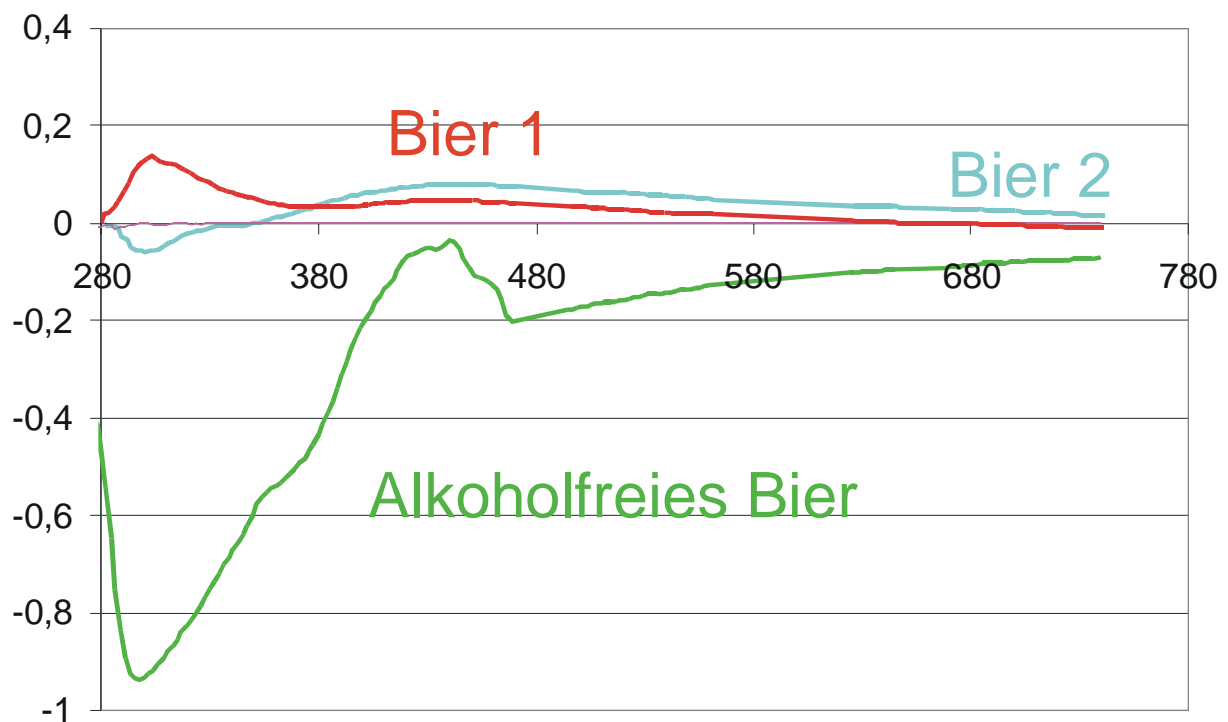


Beverage industries:

Comparison of Three Types of Beer

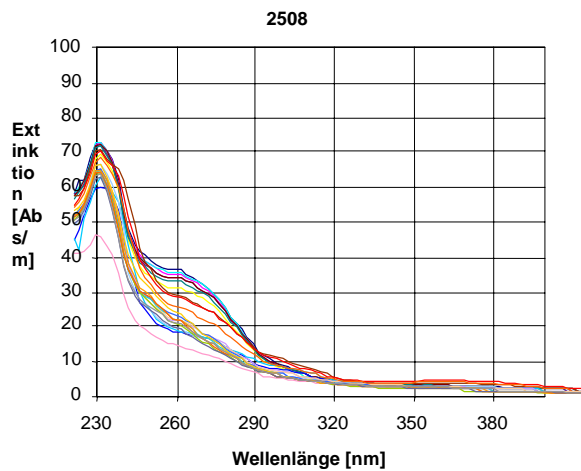
The spectral comparison of different types of beer of one brand show distinctive differences. This kind of "fingerprint" information alone opens a wide horizon of possibilities for the beverage industry, from product composition, component control up to product quality end control.

Also for non alcoholic beverages, a broad range of applications can be developed based on process UV spectrometry, like distinguishing between fruit sirups, mixing and diluting of sirups, alarm in case of quality problems with basis components, etc.

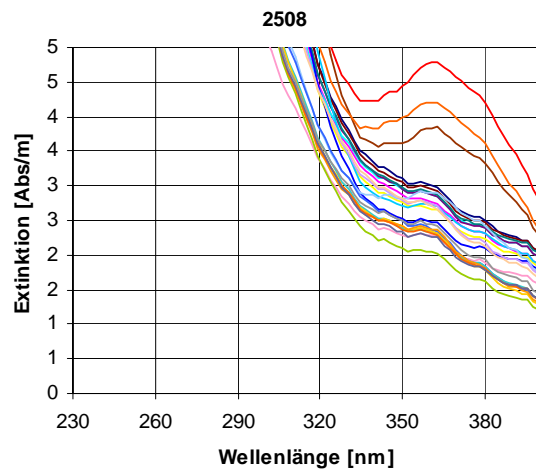


Electroplating industries: Monitoring the Effluent of an Industrial Factory with Varying Process Agents

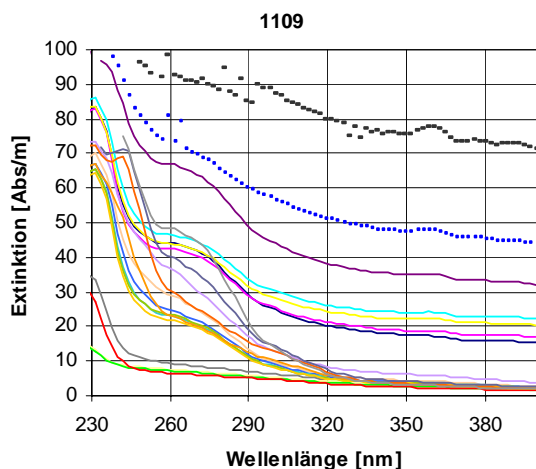
- The following figures illustrate the daily contours of the UV/VIS spectra in the runoff of an industrial WWTP. There is a one-hour interval between spectra.
- A pronounced time-dynamic behaviour can be seen; individual substance groups can be clearly distinguished: they are comprised of organic carbons of the Group A (250 – 290 nm: low-molecular compounds, aromatics, proteins, short-chain aliphatics, organic solvents, etc.), Group B (290 – 350 nm: organic and humic acids, products of biological degradation, etc.), and Group C (350 – 380 nm: no allocations to date – in any case, no simple colorants as yet).
- Allocation and calibration to processes and process-related chemicals would enable the assessment of substance groups and the establishment of internal alarm parameters (in the sense of retention of toxic substances). The COD itself has only very restricted indicative potential as a sum-parameter for such an operation.



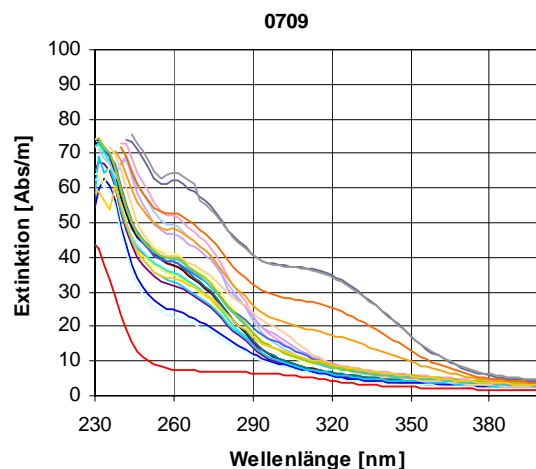
Relatively calm behaviour; movement perceptible only in the organic-carbon Area A (250-290 nm); turbidity relatively constant



Same day, different concentration scale: now a peak in the carbon Area B (350-380 nm) is also perceptible.



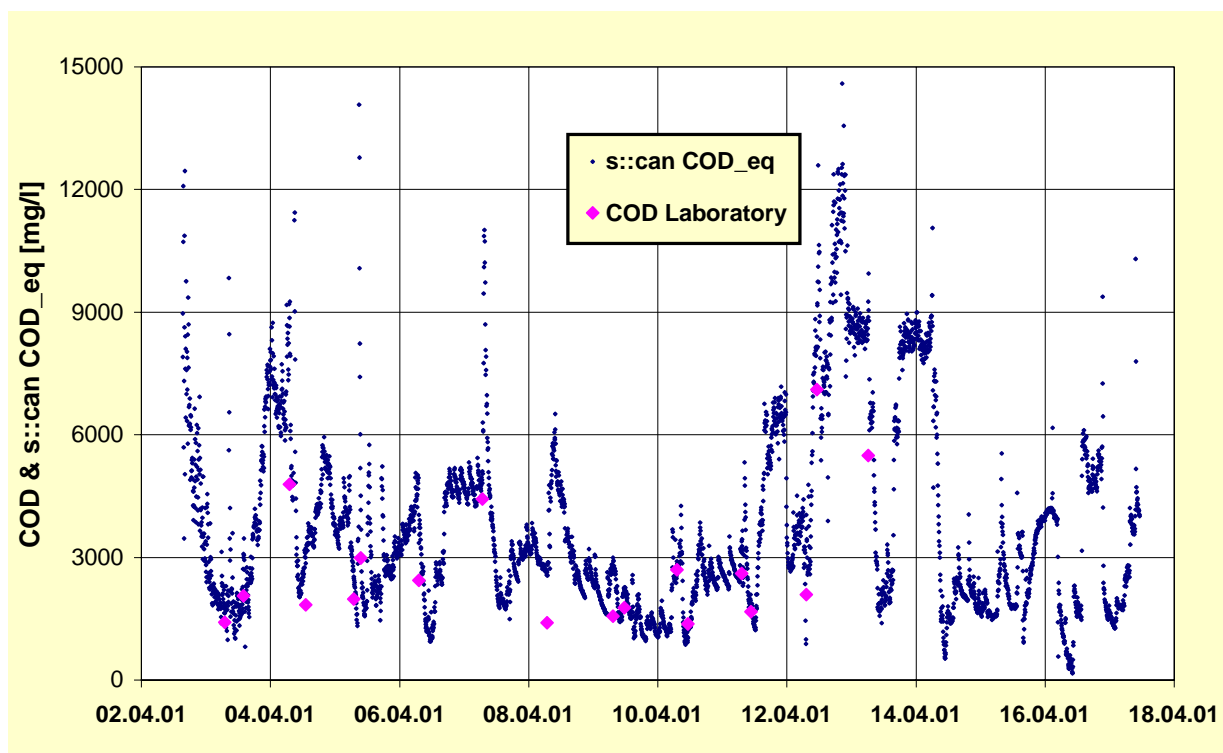
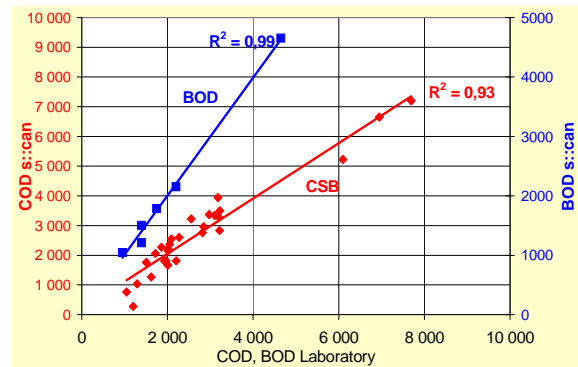
Extremely high degrees of turbidity; high values also in carbon Area A over a short time; short peak in Area C: very pure water for a short time (rinsing water?)



Significant difference between carbon Areas A and B; extreme peak of B on Sept. 7 at midnight. 1 very pure spectrum (rinsing water?)

Monitoring the Effluent of a Dairy

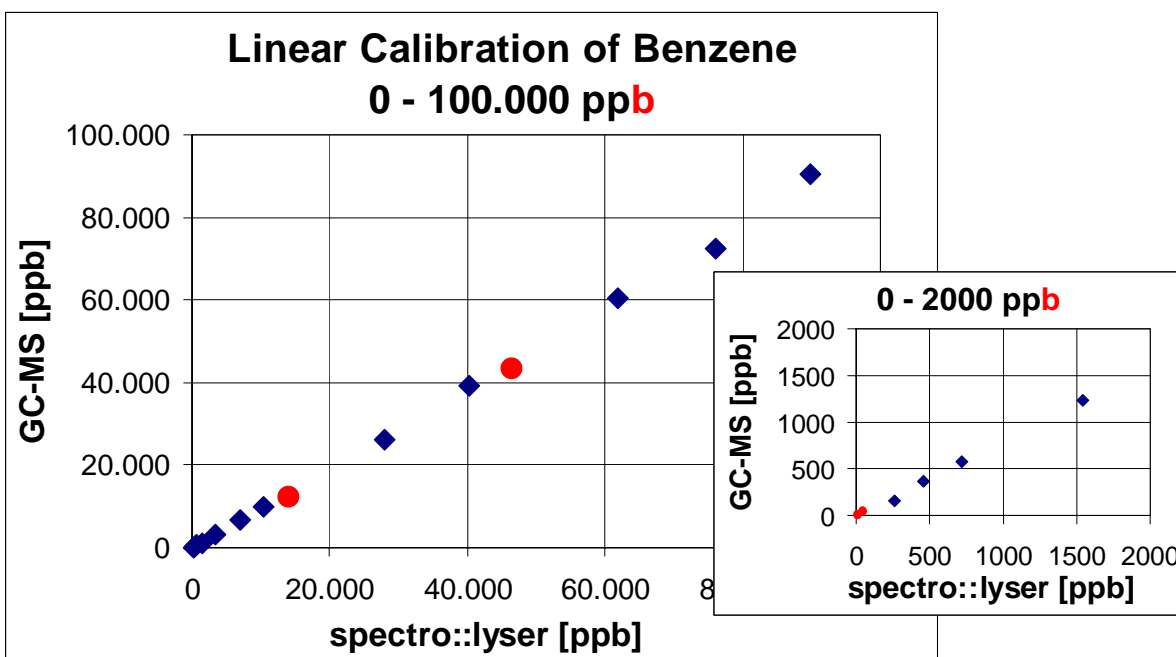
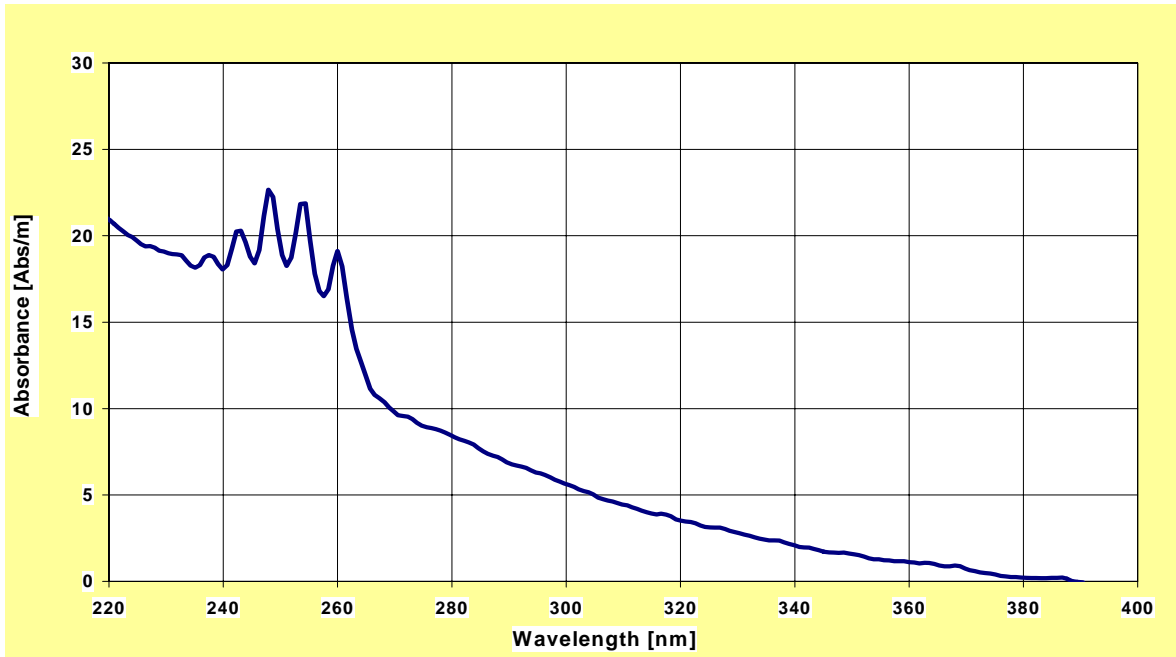
- In a dairy's effluent, online spectra are measured by a spectro::lyser™ in order to identify peaks at an early stage and to keep them away from the municipal WWTP.
- No drift whatsoever could be identified, even at high fat concentrations. The automatic pressure air cleaning keeps the windows 100 % free of deposits. Maintenance is almost zero.
- Spectral features allowed the very clear identification and stable calibration of COD and BOD in the whole range up to 20 g/l COD by automated chemometric methods (see figure right hand).



- The observed strongly dynamic behaviour, represented in above figure, allows the identification of different dairy processes (mainly washing/flushing processes) and clearly detects irregular charges.
- With the help of this information, the dairy has now a means to optimise the charge distribution.
- The WWTP manager can monitor charges and peaks and receives alarms without delay so he can react immediately if necessary.

Measuring Benzene in Groundwater

- Using new mathematical procedures, an extremely selective and accurate method for measuring aromatic compounds in the widest variety of matrices was found and subsequently validated by an independent laboratory.
- At a measuring path of 100 mm, the measuring range extends from 50 to 50,000 ppb.
- The measuring method can be applied in natural waters just as in processes, whereby the process measurement will tend to be simpler and even more accurate, due to less complex matrices.





www.s-can.at
office@s-can.at
phone +43/1/219 73 93
Vienna, Austria