# PAC

## Process Analytical Chemistry - Data Acquisition and Data Processing

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| **Main location** | Linz (Upper Austria) |
| **Other locations** | Kundl (Tirol), Salzburg, Lenzing (Upper Austria), Krems (Lower Austria), Vienna |
| **Thematic field** | Gaining valid chemical information directly from the process streams of chemical and biochemical industry, inline and in real-time. |

### Success story summary

**A novel near infrared diffuse reflection method for the determination of the cellulose content of alkali cellulose**

For the fast determination of the cellulose content of the alkali cellulose a Near infrared (NIR) method was developed.

### Success story

The viscose fibre is a cellulose based fibre which is processed out of the cellulose comprised in wood. The alkali cellulose is an intermediate in viscose fibre production. It consists of water, cellulose and sodium hydroxide. In subsequent process steps the cellulose in the alkali cellulose is transformed to the actual viscose fibre. Therefore the cellulose content is of high interest for an appropriate process control. Until now, the cellulose content is determined by a time consuming analysis combining a neutralisation, filtration and forced drying step. A reduction of measurement time would reduce costs and shorten the response time, allowing for efficient process control.



**Measurement set up for the determination of the cellulose content of alkali cellulose by NIR spectroscopy**
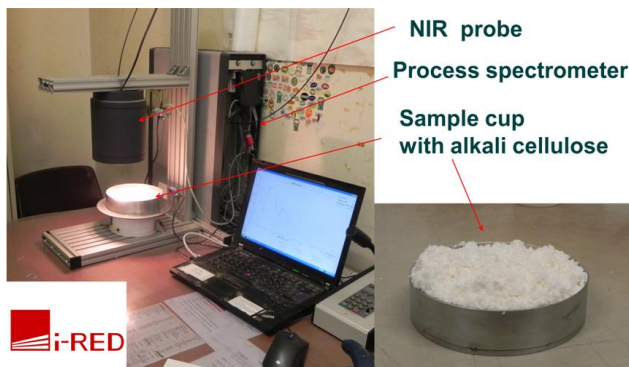
Near infrared (NIR) spectroscopy is a method, by which the time of analysis could be markedly reduced. Light, emitted by a halogen bulb, is irradiated onto the alkali cellulose sample. Most of the light is then reflected at the sample surface, whereas a particular part of the light is absorbed by the sample depending on the chemical composition of the sample, i.e. the light is not reflected as a whole. However, the light reflected is then recollected by a lens located in the measurement probe and guided to the spectrometer by an optical fibre. There, the light is disassembled into its particular wavelengths. The measurement device is now able to calculate – based on a thorough calibration done before – the cellulose content of the alkali cellulose from the intensities of the light at each individual wavelength.

The development of this Near infrared (NIR) technique was made possible due to the close collaboration of the scientific partner Wood K Plus and the company partner Lenzing AG in the K-Project PAC. The method has already been validated in a field trial at the production site of Lenzing AG. The Upper Austrian near-infrared technology supplier i-RED contributed its technical advice and support.

### Impact and effects

The new Near infrared (NIR) measurement technique for the determination of the cellulose content of the alkali cellulose facilitated a marked reduction of the analysis time compared to the conventional analytical method. Work time and consumption of chemicals could be reduced, the response time, very relevant for close process control, was improved.

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