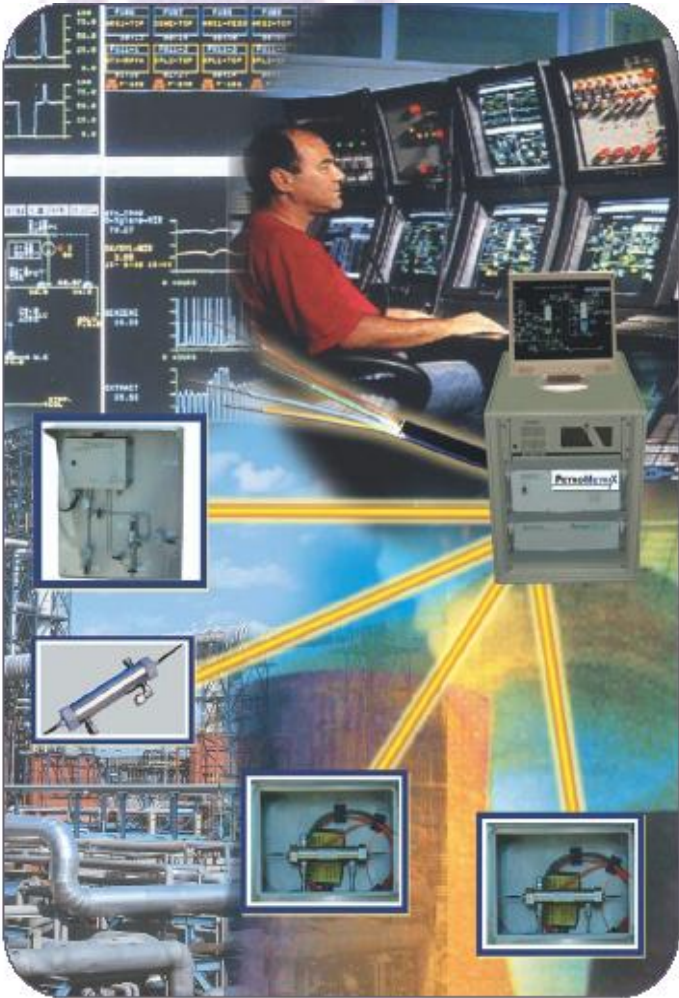


Application Note

On-line NIR Analyzer in Chemical Industry



Introduction

In chemical industrial processes, performance depends on the ability to detect and counteract problems in the process rapidly. Non-invasive and non-destructive optical monitoring of chemical composition can be accomplished using Near Infra-Red (NIR) spectroscopy. This is particularly useful in applications where reactions could progress towards either a desired product or a by-product.

NIR spectroscopy can directly indicate the

concentrations or physical properties of monitored product which can be developed into efficient tool of the process condition development.

Process Analyzer

“All-in-One” Beacon-3000 is the most advanced system for NIR process analysis. This breakthrough emerged after many years of Research & Development and field experience, along with uncompromising efforts to find solutions that perfectly meet the needs of the petroleum processing industry.

The philosophy behind the “All-in-One” Beacon System is that plant-wide, multi-stream, multi-property measurement and analysis can all be carried out by a single central system. This is accomplished by multiple process stream Field Units, situated anywhere in the plant, connected to the Main Analyzer housed in the Central Equipment Room.

Easy to Install

The Main Analyzer is located in the Control Room, protected from the process environment. The Main Analyzer connects, via telecommunications fiber optics, to the Field Units, which are installed up to 3 km (2 miles)



Easy to Calibrate

Start-up time is reduced to a minimum by simple and efficient procedure for tuning the calibration models. Thanks to our worldwide on-site support, your new Beacon System will be up and running after only a few days of commissioning.

Freetune software processes measurement results obtained by means of calibration model together with an application specific plant data, to accurately quantify the properties. Freetune includes guarding and correcting mechanisms to maintain the long and short-term accuracy required for confident close-loop process control.

In many applications, the Beacon 3000's performance and price make it an attractive alternative to traditional analyzers, such as gas chromatographs. No analyzer shelter is required, and the low maintenance requirements reduce ownership costs to a minimum.

Easy to Expand

Optical multiplexing capability enables to add more streams later to be measured by the same Analyzer.

away, close to the process. Up to 8 Field Units can be connected to one Main Analyzer.

The Field Unit uses no electricity, and contains no moving parts. This 100% optical probe requires no explosion proof housing or analyzer shelter. The Field Unit is certified under the ATEX Directive 94/9/EC (EN 60079- 28:2007).

From light bulb and detector array to sample cell and digital communication, the Beacon is a completely solid-state system – there are no moving parts. This makes it practically maintenance free – which translates into guaranteed up-time and lowest cost of ownership.

Little or no conditioning is required, further increasing the system's reliability.

Sample Measurements

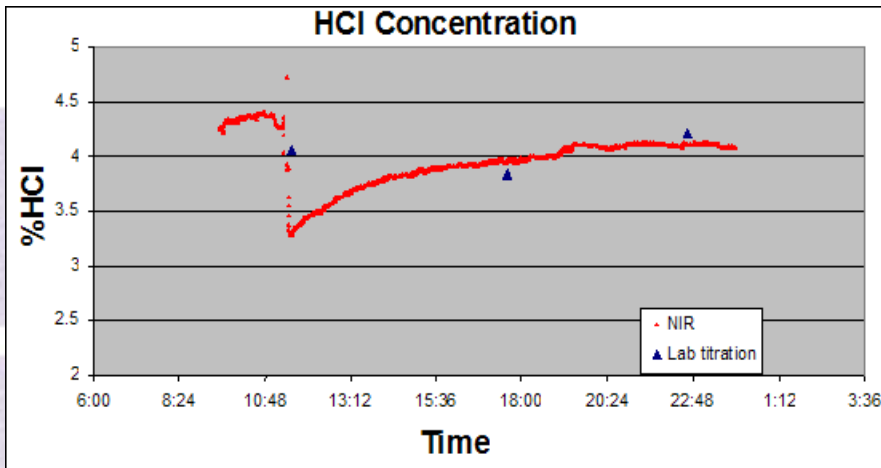


Figure 1: NIR Analyzer vs. Reference HCl concentration measurement

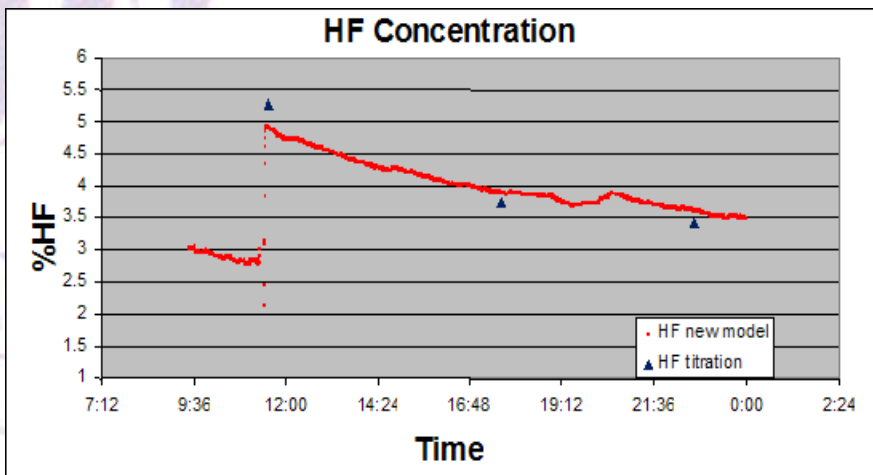


Figure 2: NIR Analyzer vs. Reference HF concentration measurement

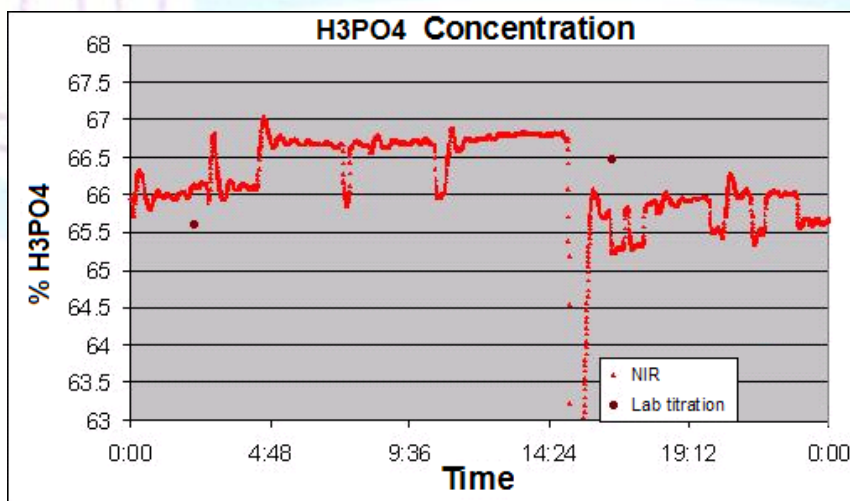


Figure 3: NIR Analyzer vs. Reference H₃PO₄ concentration measurement

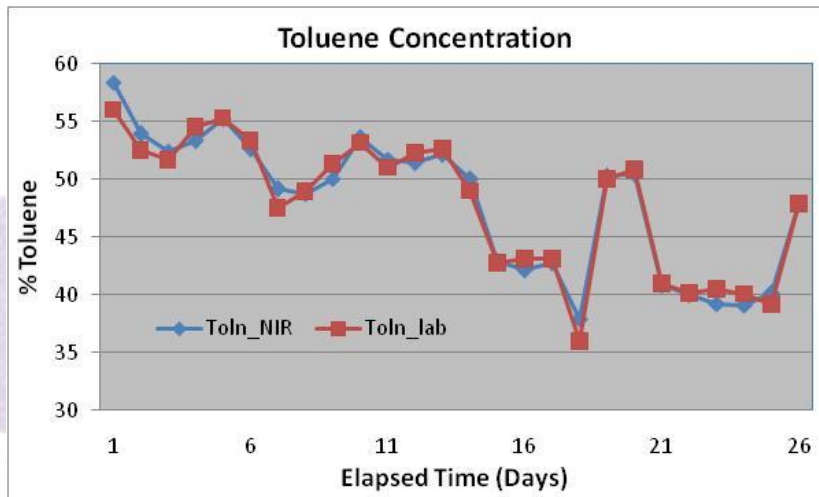


Figure 4: NIR Analyzer vs. Reference Toluene concentration measurement

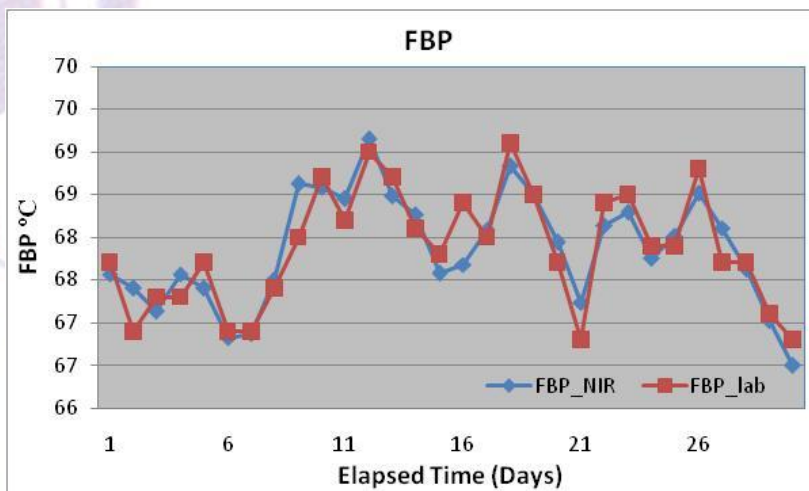


Figure 5: NIR Analyzer vs. Reference Final Boiling Point (FBP) measurement of the solvent stream

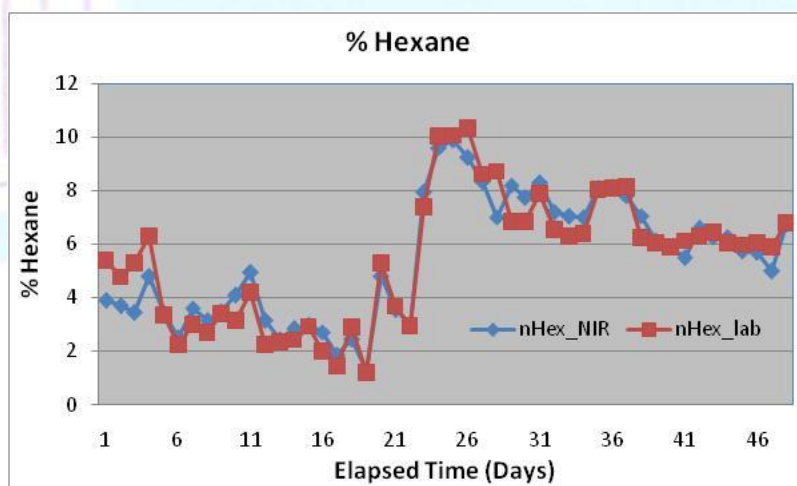


Figure 6: NIR Analyzer vs. Reference Hexane concentration measurement

Spectrometer Operation Conditions

Ambient Temperature: 0°C – 45 °C (32°F - 113°F)

Relative Humidity: 30% - 90% non-condensing

Supply Voltage: 100/120/220/VAC, 50/60 Hz (3 A max.) via on-line UPS

Maintenance: Replacement of light source every six months

Area Classification: General Purpose or Shelter

Field Unit Operating Conditions

Ambient Temperature: -40 °C to +70 °C

Maximum Sample Temperature: up to 160 °C

Sample Conditioning Requirement: Haze-free

Maximum Inlet Pressure: 550 psi (40 bars)

Flow Rate Requirement: 1 l/min to 3 l/min

Sample phase: Liquid

Weight: Approximately 7 kg (15 lb.)

Dimensions: H 30 cm - D 38 cm - W 16 cm

Routine Maintenance: None

Area Classification: Zone 1 (EN 60079-28:2007)

Performance Specification

Cycle time: 10-30 sec / stream

Main Analyzer Unit to Field Units maximum distance: 3 km

Multiplexing Capability: up to 8

Outputs:

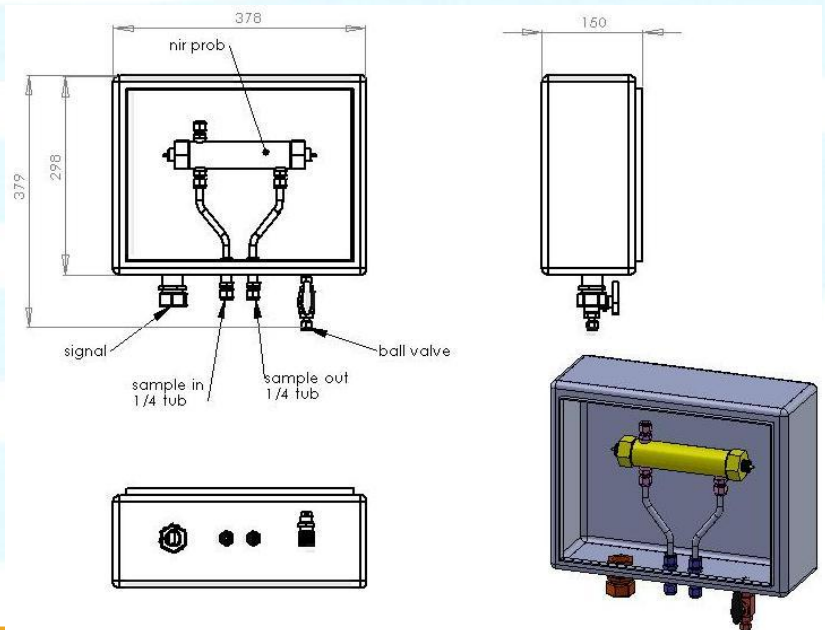
- Modbus RS 485
- TCP/IP Ethernet Communication
- Optional AO/AI/DI/Dos

Field Unit Specifications

Flow Cell body: SS 316, Teflon, Monel 400, Hastelloy C.

O-ring: Chemraz, Kalrez

Lenses: Sapphire



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Leaders in Analysis, Measurement and Automation



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