PulpTech Sales

Duralyzer-NIR

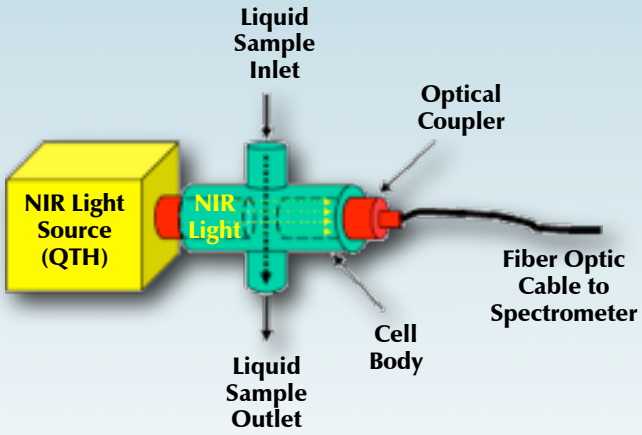
Digester Liquor Analyzer

Description

The **DURALYZER-NIR** On-line Black and White Liquor Analyzer for Digester Control is a turnkey solution for carrying out white and black liquor analysis of the digester. The analyzer is designed to extract samples from a continuous digester at strategic locations. The system is based on the Black Box™ series of industrial spectrometers. Black liquor analysis includes residual effective alkali (EA), lignin and total dissolved solids (TDS). White liquor analysis provides measurements for effective alkali (EA), sodium sulfide (Na2S), sodium carbonate (Na2CO3) and total dissolved solids (TDS). The analyzer package consists of an industrial spectrometer configured for white & black liquor analysis, an acid cleaning system to remove any scale buildup from the sampling optics and all the necessary sampling hardware to interface white & black liquor lines into the system. Up to eight samples points are brought into the system with 1/2" stainless steel tubing or equivalent. Sampling and cleaning is completely automated and is controlled by the spectrometer and sampling system microcontroller.

The unique design of this system minimizes maintenance and system cost by eliminating the large number of moving parts associated with autotitrater technology and eliminating the high pressure or steam washing system used with refractometer approaches. Unlike single point measurements such as refractometers, conductivity meters and density meters, the spectrometer approach provides a complete component analysis such as an autotitrater system without the maintenance and cost associated with autotitrater systems.

The transmission cell provides a means for NIR radiation to interact with the process sample while isolating the light source, fiber optic cable and spectrometer from the process. A typical transmission cell is composed of a body with appropriate sample inlet and outlet connections and a pair of optical couplers to deliver light to the sample and collect light after interaction with the sample. The optical couplers house a set of lenses to focus the radiation onto the tip of the fiber optic cable. The ends of the couplers in contact with the process sample have windows, usually sapphire, to provide a transparent optical path for the entering and exiting light as well as providing isolation from the process sample. Sapphire is usually the material of choice for the coupler windows due to its combination of hardness, chemical and heat resistance and transparency over a broad range of wavelengths.



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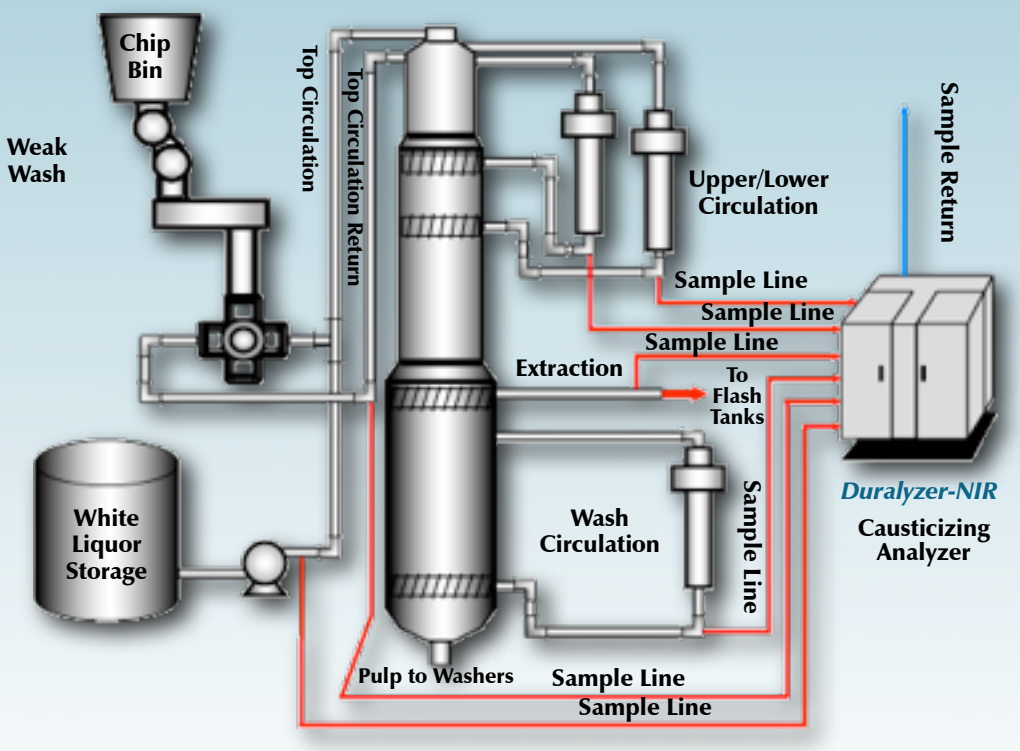
Duralyzer-NIR Black & White Liquor Analyzer

Application Technology

Reliable and accurate white liquor analysis for batch and continuous digesters is important for minimizing pulp quality variations. For both continuous and batch digesters white liquor composition needs to be accurately known to ensure that the correct effective alkali is charged for the given chip mass entering the digester. The two primary sources of variation that interfere with charging the correct amount of alkali on wood for batch and continuous digesters are chip moisture variations and white liquor variations. If white liquor composition is accurately known then one source of variation can be eliminated. With an online white liquor analyzer the white liquor can be trimmed in real time to meet target effective alkali and sulfidity levels allowing one to maintain a constant liquor to wood (L/W) ratio for a given alkali to wood ratio. Alternatively, variations in alkali to wood ratio induced by white liquor composition variations can be compensated for by only adjusting the liquor to wood ratio. Either approach requires an accurate online analysis of the cooking white liquor. The DURALYZER-NIR white liquor analyzer provides the required effective alkali (EA) and sulfidity measurements in a timely, accurate and reliable manner. Additionally, white liquor TTA, TDS and deadload levels are also available from the same analyzer.

Utility Requirements

- ***Electrical: 110-120 VAC/60Hz, 30 Amp***
- ***Air: Instrument air 70-120 psi, ⅜" SS tubing***
- ***Sample Lines: ½" Stainless Steel tubing***
- ***Drain: 1" pipe back to process***
- ***Water: Mill water 40-80 psi, ¾" tubing***
- ***I/O: 4-20mA or MODBUS/TCP***



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Duralyzer-NIR Black & White Liquor Analyzer

Primary Advantages of On-Line Duralyzer-NIR Analyzer vs. Autotitraters		
Characteristic	*Autotitrater*	*Duralyzer-NIR*
Available Measurements White & Black Liquor	EA, AA, TTA Residual EA	EA, AA, TTA, TDS, TDD Residual EA, Residual NaHS, TDS, Lignin
Measurement Technique	Inferred - Inflection point method based on pH titration curve (1).	Inferred - PLS regression technique based on TAPPI test method (Regression model relating spectral signature to chemical composition).
Complexity - Analyzer	High – special sample line requirements, diaphragm pump for slurry lines, special power and installation requirements.	Low – mill water for referencing, one moving part on spectrometer.
Complexity - Sampling System	High – special sample line requirements, diaphragm pump for slurry lines, special power and installation requirements.	Low –pre-existing sample lines, use of industrial hose for slurry lines, solid state vacuum system, std. power.
Analysis Speed	Slow - Minutes	Fast - 20 seconds
Maintenance - Analyzer	High – weekly titration acid replacement, pH probe calibration, deionized water system maintenance.	Very Low - Yearly light source replacement. Occasional lab verification.
Maintenance - Sampling System	High – 6 month valve replacement, periodic diaphragm pump replacement.	Low – 1 to 2 year pinch valve tube and, 4-6 month optics cleaning acid replacement.
Spare Parts	Wide range of custom fabricated parts from suppliers.	Easily acquired off the shelf American made parts.
Total Installed Cost (2)	High - $350,000+	Low to Moderate in comparison

1. *SCAN titration method. More sensitive to deadload variations than standard TAPPI test.*
2. *The small footprint of the NIR analyzer and the ability to use preexisting sample lines results in an installation cost of less than $30,000 compared to $100,000+ for the autotitrater.*

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