

# Causticizing Liquor Analyzer

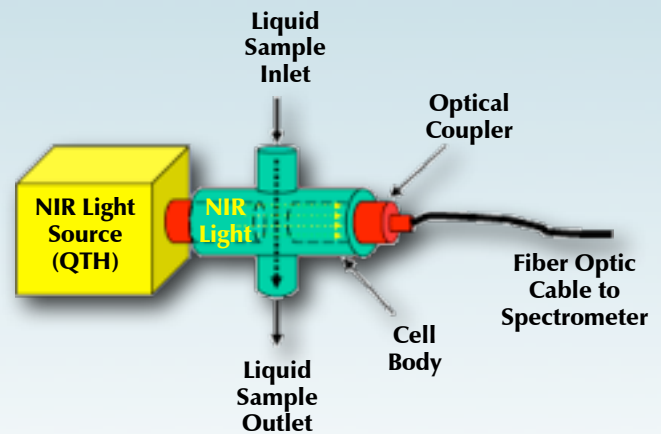
### Description

The **DURALYZER-NIR** Online White and Green Liquor Analyzer for Causticizing is a turnkey solution for carrying out white and green liquor analysis at strategic locations throughout the causticizing process. The standard configuration supports four sample lines. These include sample points from the green liquor clarifier, the slaker, a causticizing tank, and from the white liquor clarifier. Up to four additional lines can be implemented on the same analyzer. The system is based on the DURALYZER™ series of industrial spectrometers. White and green liquor analysis provides measurements for effective alkali (EA), active alkali (AA), total titrateable alkali (TTA) and total dissolved solids (TDS). All relevant causticizing parameters can be calculated from these measurements. The analyzer package consists of an industrial spectrometer configured for white & green liquor analysis, an acid cleaning system to remove any scale buildup from the sampling optics and all the necessary sampling hardware to interface white & green liquor lines into the system. Samples are brought into the system with 1/2" teflon or stainless steel tubing for pressurized lines and 3/4" EPDM hose for slurry lines. Sampling and cleaning is completely automated and is controlled by the spectrometer.



**The unique design** of this system minimizes maintenance and system cost by eliminating the large number of moving parts associated with autotitrator 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 autotitrator system without the maintenance and cost associated with autotitrator 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.



## Duralyzer-NIR White & Green Liquor Analyzer

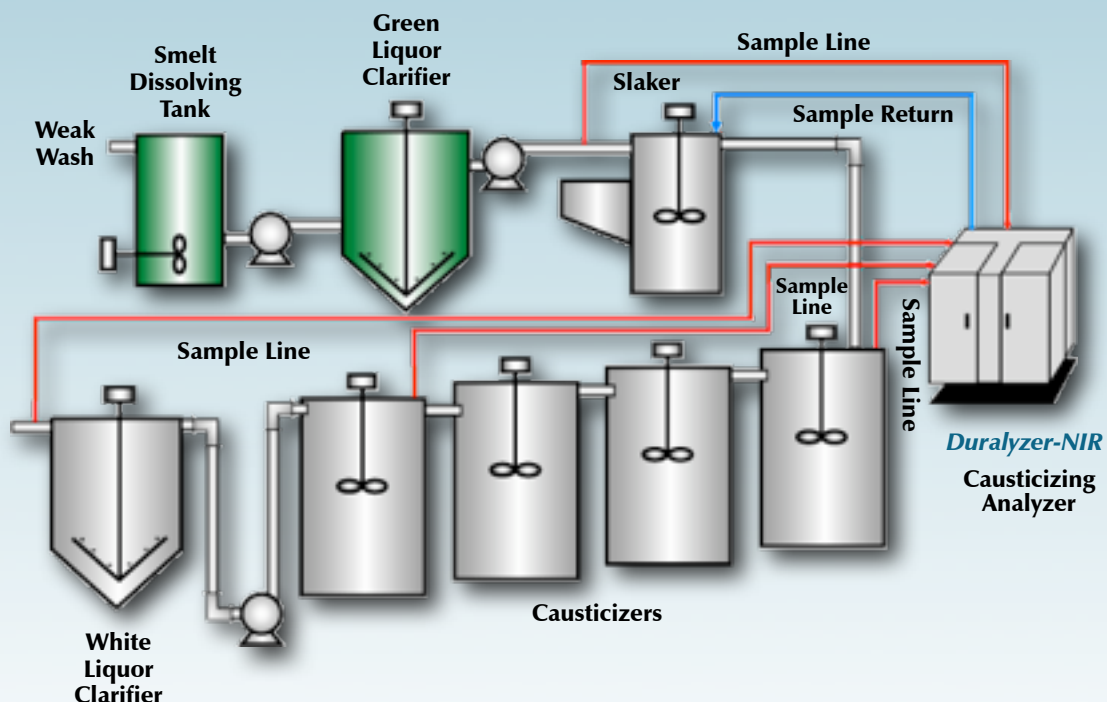
### Application Technology

Reliable and accurate green liquor analysis for the slaking process is important for optimizing lime usage. Green liquor sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) levels need to be accurately known to ensure the correct amount of lime is dosed for the incoming green liquor. The two primary sources of variation that interfere with dosing the correct amount of lime on green liquor are lime quality variations and green liquor carbonate variations. If the green liquor composition is accurately known then one source of variation can be eliminated. With online green liquor measurements the green liquor can be trimmed in real time to meet target total titrateable alkali (TTA) or  $\text{Na}_2\text{CO}_3$  levels allowing one to maintain a lime feed rate that depends only on green liquor throughput leading to reduced variations in lime screw speed. Alternatively, variations in green liquor composition can be used along with green liquor flow rate to determine the required lime dosing. Either approach requires an accurate online analysis of the green liquor entering the slaker.

The DURALYZER-NIR causticizing analyzer provides the required active alkali (AA) and TTA measurements in a timely, accurate and reliable manner. Additionally, green liquor effective alkali (EA), total dissolved solids (TDS) and total dissolved dead-load (TDD) levels are also available from the same analyzer. White liquor analysis from the downstream slurry lines provides the necessary measurements to compensate for lime quality variations.

### Utility Requirements

- ✓ **Electrical:** 110-120 VAC/60Hz, 10 Amp
- ✓ **Air:** Instrument air 65-120 psi
- ✓ **Sample Lines:** 1/2" SS tubing, 3/4" EPDM hose
- ✓ **Drain:** 3/4" hose back to process
- ✓ **Water:** Mill water 40-80 psi, 3/4" tubing
- ✓ **I/O:** 4-20mA or MODBUS/TCP



## Duralyzer-NIR White & Green Liquor Analyzer

### Primary Advantages of On-Line Duralyzer-NIR Analyzer vs. Autotitraters

<i>Characteristic</i>	<i>Autotitrater</i>	<i>Duralyzer-NIR</i>
Available Measurements White & Green Liquor	EA, AA, TTA	EA, AA, TTA, TDS, TDD (total dissolved dead load)
Measurement Technique	Inferred - Inflection point method based on pH titration curve <sup>(1)</sup> .	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 <sup>(2)</sup>	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.