DESKTOP LIQUOR ANALYZER

The Duralyzer-NIR Bench Top Liquor Analyzer for fast Process Analysis

THE BENCH TOP LIQUOR ANALYZER has been designed to overcome all of the issues associated with manual liquor testing, providing fast, reliable and accurate results with minimal operator involvement. The DURALYZER-NIR bench top analyzer provides the results of the standard ABC titration test, providing effective alkali (EA), active alkali (AA) and total titrateable alkali (TTA) measurements for white and green liquors. In addition, total dissolved solids (TDS) and total dissolved deadload (TDD) measurements are also provided. For black liquors, residual effective alkali (REA), residual active alkali (RAA), lignin and black liquor TDS measurements are provided. The DURALYZER-NIR bench top analyzer uses the same NIR technology that is used in our online analyzers. This instrument has been designed specifically for the somewhat harsh lab environments of the pulping and recovery areas providing many years of trouble free operation. The only required maintenance for the instrument is an annual replacement of the light source and occasional acid cleaning of the sample holders.

MANUAL LIQUOR TESTING has to be performed routinely for quality control purposes. More often than not, lab testing is the only measurement procedure available for process control decisions. The tedious and cumbersome nature of the standard ABC titration test for white, green and black liquors does not lend itself well to rapid manual testing. However, the nature of this testing procedure does lend itself well to induced errors if it is not performed with care and attention. As a result, liquor testing frequency is low and potentially biased and is usually performed at most once or twice per shift. The result of this practice is that much of the process variation is missed as well as the opportunity to reduce process variations.

DURALYZER-NIR VS. TITRATION

The standard ABC titration test requires multiple chemicals and lab equipment to implement. Titration chemicals such as certified HCl solution, formaldehyde, barium chloride and various color indicators are inconvenient and costly to maintain in the process testing lab. If a pH probe is used to monitor the titration then pH standards must also be kept on hand to calibrate the probe. In addition to the chemical requirements, precision volume measurement equipment for the sample and titration acid must be maintained in good working order and periodically calibrated. Bench top titraters have been implemented to automate the actual titration test. However, most of the same issues associated with the manual test are also present with the bench top titrater. At a minimum, titration acid and pH standards as well as precision volume measuring equipment are still needed for the bench top titrater. Most bench top titraters are based on the SCAN titration method. This method differs from the TAPPI standard ABC titration test in that formaldehyde and barium chloride are not used. Instead, a pH curve is generated as a function of the added titration acid. Inflection points on the titration curve are used to estimate the EA, AA and TTA values of the liquor sample. This technique can suffer from difficult to locate inflection points, especially for the AA point. The inflection point locations can vary with varying deadload concentrations, leading to erroneous concentration estimates. This effect is especially pronounced on the AA inflection point. The DURALYZER-NIR bench top analyzer completely eliminates all of the negative issues associated with manual and automated titrations by eliminating the chemical requirements, accurate volume measurement requirements and the effects of deadload variations. A table detailing the primary advantages of the DURALYZER-NIR bench top analyzer compared to current practices is given below.

DURALYZER-NIR Bench Top Analyzer .vs. Titration Methods

Characteristic	Titration Methods	DURALYZER-NIR Bench Top Analyzer
Available Measurements	EA, AA, TTA	EA, AA, TTA, TDS, TDD, Lignin
Measurement Technique	Inferred – Inflection point method based on pH titration curve[1]	Inferred – PLS regression technique based on TAPPI test methods (Regression model relating spectral signature to chemical composition)
Measurement Accuracy	Potential operator bias due to volume errors. Many opportunities to introduce errors	All operator bias removed since an accurate volume of sample is not needed. Almost no opportunities for induced errors.
Analysis Speed	Slow – Minutes[2]	Fast – 20 seconds
Maintenance	High – Replacement chemicals, pH probe calibration, premature titrater failure[3]	Very Low – Yearly light source replacement, occasional lab validation

1. SCAN titration method. More sensitive to deadload variations than standard TAPPI ABC test method.
2. Analysis speeds vary greatly from several minutes for bench top titraters to tens of minutes for a full manual ABC test.
3. Current commercial bench top titraters do not hold up well in the somewhat harsh process lab environment.

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