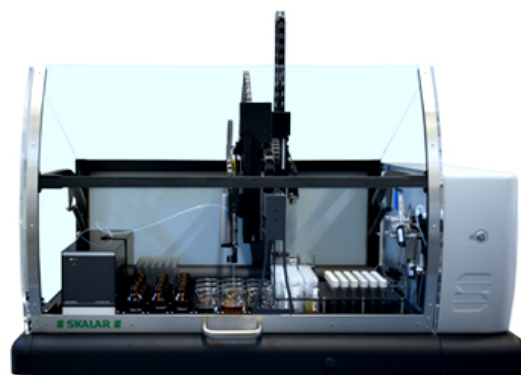


The SP2000 Beer & Wort Analyzer

Application Sheet



Beta-glucan analysis in Beer

Introduction:

Beta glucan is a polysaccharide, a polymer of D-glucose linked by beta-glycosidic bonds. It's a structural component of the cell walls in various cereals (e.g. barley) endosperm. From brewing point of view, beta-glucan in barley, malt, wort and beer provides great challenges during malting and brewing process. Due to its high viscosity and high molecular weight, insufficient degradation of beta-glucan during malting will cause reduced rates of wort separation and beer filtration and the formation of hazes, gels, and precipitates. Thus, it is important to determine the concentration of beta-glucan. Typical methods involve enzymatic or precipitation reactions, not the best choice in term of precision and ease of work, or automation. There is also widely used fast, precise and accurate automated fluorimetric flow analysis, however it requires a special spectrophotometer. To be more versatile and cost effective a colorimetric method for beta-glucan analysis was developed on the SP2000 Beer Robotic Analyzer.

Method:

The automated procedure for the determination of beta-glucan is based on complex formation of beta-glucan with calcofluor of which absorption can be measured at 405nm.

Instrument & accessories:

- An SP2000 robotic beer & wort analyzer including: magnetic stirrer for automatic degassing of the samples, dilution of samples, dispenser/pumps for addition of reagents, flow cell and photometer for measurement.
- Glassware including: reagent bottles, test tubes, sample beakers and vials

Sample preparation:

There is no specific sample preparation required, the beer samples can be placed directly on the robot.

Reagents:

Reagent	Name
A	Tris buffer solution pH 8
B	Calcofluor working reagent
C	Water

Method settings:

All settings are predefined in the software. These settings are optimized according to the test results from the Skalar application laboratory.

Calibration:

This method requires a calibration. The calibration is made from a stock solution, which is diluted into several working standards. The robot prepares the working solutions automatically.

Reagent	Name	Note
Stock solution	350 mg/l Beta-glucan	Prepare in water instead of beer.
Stock solution to place on the robot	100 mg/l Beta-glucan	

Working standards

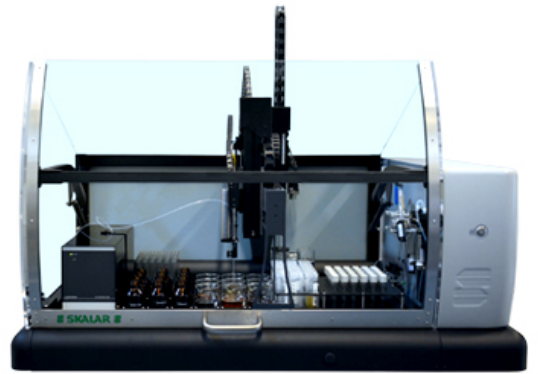
For example, 5 working standards, each of 8 ml volume:

5 mg/l beta-glucan
10 mg/l beta-glucan
20 mg/l beta-glucan
30 mg/l beta-glucan
40 mg/l beta-glucan

The working solutions should be prepared on the day of analysis. If a calibration from a previous analysis should be used, it is highly recommended to use a quality control sample to check the performance (especially the quality of the reagents).

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Procedure:

Sample is poured into the beakers. The beakers containing sample, test tubes and necessary reagents are loaded on the analyzer by the operator.

The sample table is set up and the analyzer is started:

1. The robot starts initialization.
2. The samples are automatically degassed.
3. Calibration standards are diluted, if a calibration is selected.
4. The samples are diluted, if dilution was selected (Note: if the beta-glucan content is > 40 mg/L, it is necessary to dilute the sample)
5. The meter is blanked with water at 405 nm. The analysis sequence is always made in pairs (blank and sample).
6. 7.0 ml of Tris buffer solution (reagent A), and 1.2 ml of sample is picked-up. Between buffer and sample the needle is rinsed.
7. The solution/sample mix is dispensed in the first test tube for blank analysis.
8. The solution is mixed with a mechanical stirrer
9. The first sample also needs to follow same procedure for sample analysis. Steps 6 – 8 are repeated with Calcofluor instead of tris buffer.
10. After the reaction time (e.g. 360 seconds), the blank and sample are measured at 405 nm.
11. The results are shown on the software screen in two different columns.
12. After measurement of the first pair (blank/sample), the next pair is processed in the same way

Note:

- In between the steps, the sample needle, lines and flow cell are flushed with water.
- The analyzer keeps track of the reaction time ensuring the blank and sample analysis are exactly the same.

References:

1. Aastrup, S., and Jorgensen, K.G., in: Linskens, H.F., Jackson, J.F., (eds), "Modern methods of plant analysis", Springer 1988, Vol. 7, page 56-66.
2. Analytical EBC, 1997, method 3.2.
3. McCleary, B.V., and Glennie and Holmes, M., Journal of the institute of Brewing, 1985, 91, page 285-295.
4. ISO 3696:1987, Water for analytical laboratory use. Specification and test methods.
5. ASTM, D1193, Standard Specification for Reagent Water.

Benefits Skalar SP2000 Beer & Wort analyzer

- Complete automation incl. degassing of the samples, (de)-capping the sample tube, sample dilution, addition of reagents, mixing and photometric measurement of the sample.
- Accurate, reliable and reproducible results
- Flexibility to process small or large batches and run single or multiparameter analysis
- Custom made design
- Methods according EBC, ASBC, Mebak and others
- Possibility to combine the beta-glucan application with the measurement of pH, color, FAN, total polyphenols, SO_2 , anthocyanogen, iron, TBI, bitterness etc.