

## DETERMINATION OF SOLUBLE NITROGEN BY SPECTROPHOTOMETRY

Submitted by S. Lie on behalf of the Analysis Committee of the European Brewery Convention

**A simple spectrophotometric method for the determination of nitrogen in unhopped wort has been tested by the EBC Analysis Committee and accepted for inclusion in Analytica-EBC. The spectrophotometric method is intended as a quick method for routine quality control. It is emphasized that the procedure has to be followed in detail and that the precautions stated under Notes on Procedure are most important. The average precision values obtained for the range 600 to 850 mg/litre were  $r_{95}=30$  and  $R_{95}=104$ .**

**Key Words:** Absorption, Kjeldahl, spectrophotometry, soluble nitrogen.

### INTRODUCTION

Among the several non-destructive methods for the determination of nitrogen content the spectrophotometric method is the most simple. It is based on the UV absorption of protein and the observation of Waddel<sup>3</sup> in 1956 who found a correlation between nitrogen content determined by the Kjeldahl method and the difference between the extinction values at 215 nm and 225 nm in plasma proteins. In 1967 Franken-Luykx<sup>1</sup> applied this principle for the determination of nitrogen in unhopped wort and found a high correlation between nitrogen content determined by the Kjeldahl method and the difference between the two extinctions, 215 nm and 225 nm. It is stressed that the formula presented in the publication<sup>1</sup> can not be applied to hopped wort and beer because of interference by hop constituents.

The American Society of Brewing Chemists tested the spectrophotometric method and recommended it for inclusion in Methods of Analysis in 1990.<sup>2</sup> The Analysis Committee of the European Brewery Convention carried out two tests, the first one in January 1992. The results from the last test in January 1993 were judged to be acceptable for inclusion in Analytica-EBC but with the limitation that it should not be used in commercial transactions.

### METHOD

Seven malt samples were sent to the 15 members of the subcommittee for establishing regression equations between wort soluble nitrogen measured by the Kjeldahl method and the extinction values from the spectrophotometric method. A

second series of malts consisted of three sample pairs ranging in wort soluble nitrogen from 600 to 850 mg/litre. These malts were mashed and the wort soluble nitrogen measured from the established regression equations. Results obtained were analyzed statistically. Thirteen collaborators reported results in the final test. In the table below under "number of labs" the total number of participants were 13 and the number of outliers were 2 for malt I, 3 for malt II and 2 for malt III.

### Statistical Summary of Results

Malt	Number of labs	Mean mg/l	$S_r$	$CV_{ST}\%$	$r_{95}$	$S_R$	$CV_{SR}$	$R_{95}$
I	11/13	602	6.03	1.00	17	35	5.9	99
II	10/13	813	6.02	0.74	17	35	4.3	98
III	11/13	849	20.4	2.40	57	41	4.9	116

### CONCLUSIONS

The spectrophotometric method is sensitive to several details in the procedure and it is therefore most important that the Notes on Procedure are studied carefully. The method is considered to be most useful for routine quality control and is recommended for inclusion in Analytica-EBC with the limitation that it is not intended for commercial transactions.

### REFERENCES

1. Franken-Luykx, J. M. M. *Journal of the Institute of Brewing*, 1967, 73, 187-189.
2. Subcommittee Report. *Journal of the American Society of Brewing Chemists*, 1990, 48, 149-151.
3. Waddel, W. J. *Journal of Laboratory and Clinical Medicine*, 1956, 48, 311.