Nitrogen & protein determination instarch and gluten

KjelDigester K-449, KjelMaster K-375 with KjelSampler K-376 and DuMaster D-480

1. Introduction

Gluten and starch are typical samples consisting of a high and a low protein content, respectively. Here, both sampels are analyzed for their protein content according to Kjeldahl and Dumas. In general, the Kjeldahl method is applied to determine the organic nitrogen, whereas the organic and inorganic nitrogen content is measured using the Dumas method. Here we show the feasibility to analyze gluten and starch, both samples are expected to contain organic nitrogen only.

2. Experiment

Sample:

Gluten powder, Starch powder

Equipment:

For protein determination according to Kjeldahl:

KjelDigester K-449 (the parameters used are also valid for the K-446), Scrubber K-415 TripleScrub^{ECO}, KjelMaster K-375, KjelSampler K-376 (the parameters used are also valid for the K-377)

For protein determination according to Dumas:·

D-480 DuMaster

Procedure:

Procedure for the Kjeldahl Method:

The samples were digested and afterwards distillated and titrated.

Procedure for the Dumas Method:

The samples were packed and afterwards combusted and analyzed with the DuMaster D-480.

Table 1. Parameters for the KjelMaster System K-375/K-376

Parameters	Settings
Reaction time	5 s
Distillation time	180 s
Titration type	Boric acid

3. Results

The results of nitrogen content of gluten and starch powder with the Kjeldahl and Dumas Method are shown in Table 2.

Table 2. Results of nitrogen content in gluten and starch powder with Kjeldahl and Dumas Method.

Method	Sample	Ø Nitrogen [%]	RSD [%]
Kjeldahl Method	Gluten powder	9.498	0.337
Kjeldahl Method	Starch powder	0.046	0.619
Dumas Method	Gluten powder	9.497	0.409
Dumas Method	Starch powder	0.046	7.468

4. Conclusion

The determination of nitrogen and protein in gluten and starch using the KjelDigester K-449and KjelMaster System K-375/K-376 provides reliable and reproducible results and is fully automated. The results correspond well to the expected values. Furthermore, the protein content determined with the D-480 provide also reliable and reproducible results and the system allows automated and unattented operation as well. Comparing the results of gluten and starch determined with both methods the values areas expected and identical. Therefore, both methods are equally suitable for the determination of nitrogen and protein in gluten and starch. For further information please download the full application note from the website.

5. References

Application Note No. 201/2015: Nitrogen & protein determination in starch and gluten
Application Note 110/2013 Nitrogen and protein determination in corn, flour and soy according to Kjeldahl, BUCHI.*,**
ISO 20483:2006 Cereals and pulses –Determination of the nitrogen content and calculation of the crude protein content –Kjeldahl method.
KjelOpimizerApp can be downloaded from iTunes and GooglePlay.
Application Note 159/2014 Nitrogen and protein determination in cereals and oil seeds according to the Dumas method.*,**
AOAC 992.23 Crude Protein Cereal Grains and Oilseeds, Generic Combustion Method, 1993.

* All application notes can be downloaded from following link: http://www.buchi.com/en/applications/finder
**Information about the Kjeldahl and Dumas is available here: http://www.buchi.com/en/content/kjeldahl-dumas