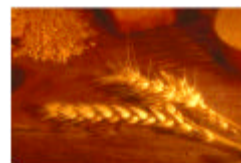
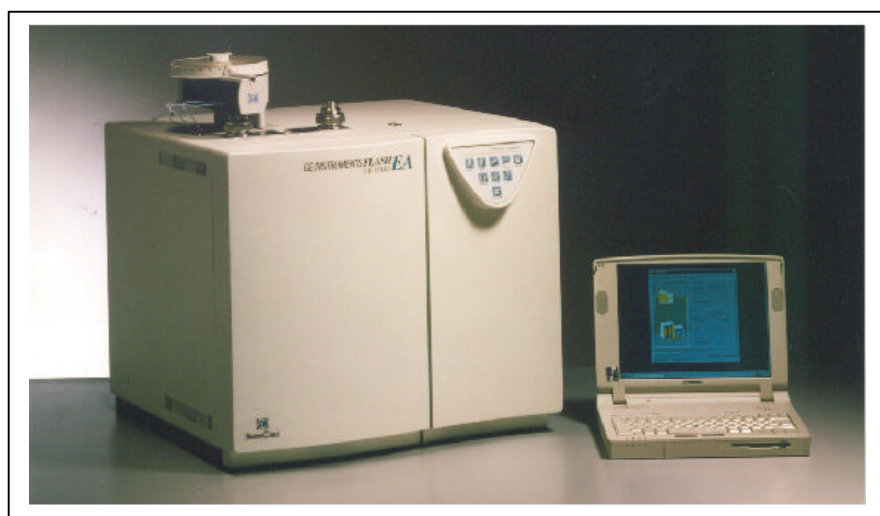


AN 631**Flash 2000 Protein Analyzer****Reproducibility of Nitrogen/Protein determination**

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- ❑ Large sample weight
- ❑ Easier sample handling
- ❑ Automated, unattended analysis
- ❑ Fast analysis: less than 5 minutes
- ❑ Outstanding day to day reproducibility

**INTRODUCTION**

In a typical production process in food industry, the protein content is periodically monitored and tested for quality control.

The determination of total nitrogen is the simplest way for determining the protein content in various matrices as the direct protein determination is very difficult due to the complexity and variety of protein molecules.

Therefore the reproducibility of data, measured as deviation of results from their mean value, is one of the first objectives in all analytical tests to have alternative techniques accepted.

In this light the Flash 2000 Protein Analyzer has proven to be reliable and cope with a wide array of additional important requirements of modern laboratories such as accuracy, high sample throughput and low cost per analysis.

DESCRIPTION OF THE ANALYTICAL METHOD

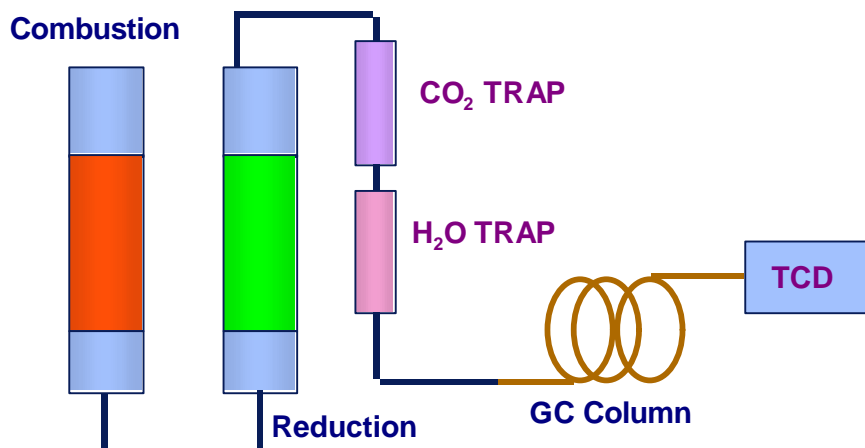
The Analyzer is based on the dynamic flash combustion of the sample. The sample is weighed in a tin capsule and introduced into the combustion reactor via the MAS 200R Autosampler together with a proper amount of oxygen by OxyTune™ function.

After combustion, the produced gases are carried by a helium flow to a second reactor filled with copper, then swept through CO₂ and H₂O traps, a GC column and finally detected by a thermal conductivity detector.

A complete N/Protein report is automatically generated by the Eager Xperience dedicated software and displayed at the end of the analytical routine.

Eager Xperience also allows the sample weight transfer from the balanceto the sample table, and the complete control of the analytical parameters of the instrument.

Analytical Layout of Flash 2000 Protein Analyzer



ANALYTICAL CONDITIONS

Combustion temperature: 900°C
 Reduction temperature: 680°C
 Oven temperature: 50 °C
 Helium pressure: 250kPa
 Helim flow rate:
 Measurement: 140 ml/min
 Reference: 100 ml/min
 Oxygen flow rate: 300 ml/min
 (pressure 300 kPa)
 Total run time: less than 5 minutes
 Nominal sample weight: 200-300 mg
 Standard: 50-100 mg Aspartic acid
 Calibration Method: K factor

RESULTS

To validate the system, different types of samples were chosen. The protein content is calculated using the protein factor 6.25.

The reproducibility obtained analyzing pasta, flour and couscous 5 times consecutively is reported in Table 1.

Table 1 – Reproducibility of Nitrogen/Protein determination

Flour			Pasta			Couscous		
W (mg)	N %	Prot. %	W (mg)	N %	Prot. %	W (mg)	N %	Prot. %
267.1	1.27	7.92	256.70	1.97	12.29	343.4	2.04	12.76
219.9	1.27	7.92	230.40	1.96	12.26	295.5	2.04	12.72
305.8	1.27	7.93	249.70	1.96	12.24	303.9	2.06	12.90
249.1	1.26	7.86	247.10	1.96	12.27	337.2	2.06	12.85
273.8	1.27	7.92	245.70	1.96	12.28	258.7	2.05	12.79
Average	1.27	7.91	Average	1.96	12.27	Average	2.05	12.80
RSD %	0.35	0.35	RSD %	0.23	0.16	RSD %	0.49	0.55

Table 2 shows the day to day data. In one day the sample was analyzed at different times and for 3 consecutive days.

The data show an excellent reproducibility and no effect on the results was observed changing the weight of the sample.

No recalibration of the system was necessary during the 3 days of the test, indicating the stability of the system.

Table 1 – Day to Day reproducibility of Semoline sample

Day 1			Day 2			Day 3		
W (mg)	N %	Prot %	W (mg)	N %	Prot %	W (mg)	N %	Prot %
102.5	2.06	12.89	202.2	2.08	12.98	217.7	2.10	13.14
167.6	2.07	12.95	208.7	2.06	12.90	221.1	2.07	12.93
216.9	2.06	12.91	207.3	2.09	13.06	215.2	2.08	12.98
126.7	2.09	13.07	199.7	2.07	12.95	314.8	2.08	13.02
184.9	2.08	13.01	199.7	2.09	13.09	294.9	2.07	12.96
239.2	2.07	12.95	296.1	2.08	12.99	285.4	2.10	13.14
296.6	2.05	12.81	294.2	2.09	13.05	280.8	2.09	13.10
			304.7	2.09	13.08	287.1	2.09	13.07
			295.7	2.09	13.09	108.8	2.05	12.83
			300.0	2.10	13.13	103.6	2.03	12.69

Statistical Data: Number of runs: 27;
 Average N %: 2.08; RSD %: 0.83
 Average Protein %: 12.99; RSD %: 0.83