

Nitrogen/Protein determination in meat derivative products using the Thermo Scientific FLASH 4000

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Key Words

- Flash combustion
- Food safety
- Meat
- Nitrogen
- Protein

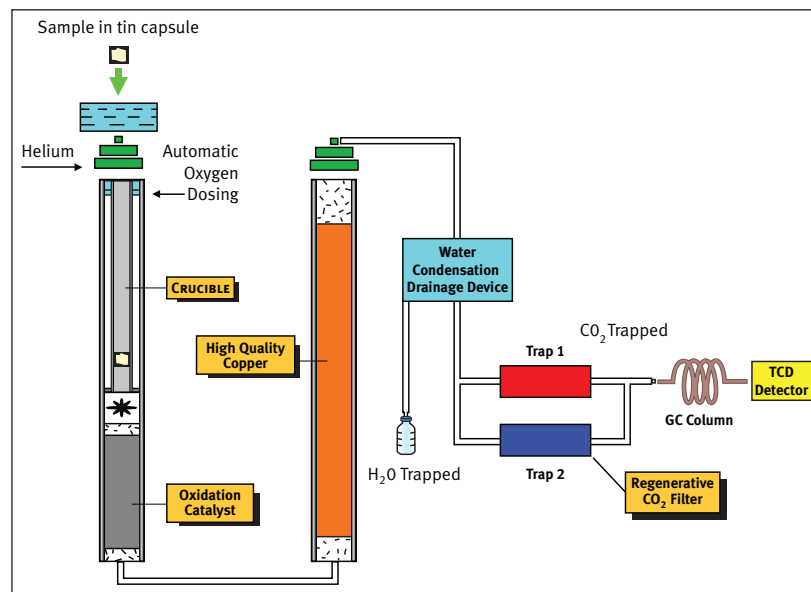


Introduction

Meat and meat products are one of the main components of the human diet. New regulations regarding all processed food and most raw foods include a series of tests determining their nutritional composition and how they relate to a healthy diet. One of the most important nutrients is Protein and the monitoring of its amount, through the determination of Nitrogen, must be accurate to establish the nutritional quality of these meat products.

Following the approval of the combustion method by the AOAC (method 992.15) new advances in instrumentation and computers have greatly improved the capabilities of the combustion method, making it faster, safer and more reliable than the traditional Kjeldahl method. The Thermo Scientific FLASH 4000 N/Protein Analyzer requires no sample digestion and toxic chemicals, while providing important advantages in terms of time, automation and quantitative determination of Nitrogen in all sample matrices.

Analytical Configuration



Results

Before analysis, the Official AOAC Method 992.15 indicates that each sample should be passed through a grinder (twice for emulsified meat products or three times for non-emulsified [coarse or whole muscle] products), then mixed thoroughly after each grinding.

The two meat product samples analyzed were chosen because of their different nature. Ham products contain high water content while salame contains high fat content. This distinction means that the combustion level and amount of Oxygen required is completely different. The data obtained shows no-matrix effect in the determination of Nitrogen. The Protein content is calculated automatically by the Thermo Scientific Eager Xperience dedicated software using the default Protein factor of 6.25. The Protein factor can be change in accordance with the food type.



Analytical conditions

Left reactor temperature: 950 °C
Right reactor temperature: 840 °C
Temperature oven: 50 °C
Carrier Flow (He): 300 ml/min
Reference Flow (He): 300 ml/min

Standard: EDTA (9.59 %N)
Standard weight: 500 mg
Sample weight:
400 mg – 2.5 g for ham
600 mg – 1.8 g for salame

Note: The Oxygen amount necessary for sample combustion is calculated automatically by the OxyTune function (OxyTune®) present in the Eager Xperience dedicated software.

Table 1 shows the reproducibility of 10 consecutive runs of *ham* using a sample weight of about 1000 mg, while Table 2 shows the reproducibility in a wide range of weight (400-2500 mg). No significant difference was observed in the data obtained. The ham sample was homogenized with a knife mill.

Table 1: Ham Application

Weight (mg)	N %	Protein %
992.5	2.7966	17.4790
994.2	2.7966	17.4787
992.7	2.8409	17.7557
993.4	2.8485	17.8031
1011.4	2.8545	17.8404
995.5	2.8297	17.6856
995.0	2.8548	17.8424
996.8	2.8249	17.6558
998.3	2.7840	17.4003
997.5	2.7740	17.3373
Av.N %	2.8204	17.6278
RSD %	1.0746	1.0746

Table 2: Ham Application

Weight (mg)	N %	Protein %	Av. N %	Av. Prot %	RSD %
395.9	2.8733	17.9581	2.8463	17.8934	0.9613
393.3	2.8186	17.6161			
418.5	2.8470	18.1061			
608.8	2.8267	17.6671	2.8440	17.7751	0.7491
594.7	2.8375	17.7344			
601.5	2.8678	17.9239			
1488.2	2.7938	17.4615	2.8093	17.3497	1.0032
1504.8	2.8418	17.1364			
1510.2	2.7922	17.4513			
2000.0	2.8213	17.6330	2.8024	17.5148	0.9594
1987.3	2.8142	17.5890			
2009.6	2.7716	17.3224			
2510.6	2.8215	17.6347	2.8384	17.7398	0.8458
2487.9	2.8659	17.9116			
2492.1	2.8277	17.6731			

Table 3 shows the reproducibility of 10 consecutive runs of *salame* using a sample weight of about 1000 mg. Table 4 shows the reproducibility in a wide range of weight (500-1800 mg). No significant difference was observed in the data obtained. The salame sample was homogenized with a knife mill.

Table 3: Salame Application

Weight (mg)	N %	Protein %
1012.5	4.5253	28.2834
1000.4	4.5297	28.3105
997.5	4.4433	27.7705
1001.2	4.4565	27.8532
999.4	4.5645	28.5282
995.8	4.4551	27.8444
1016.8	4.5393	28.3707
1010.7	4.4134	27.5835
1002.8	4.5591	28.4944
1007.7	4.4021	27.5131
Av.N %	2.8204	17.6278
RSD %	1.0746	1.0746

Table 4: Salame Application

Weight (mg)	N %	Protein %	Av. N %	Av. Prot %	RSD %
608.4	4.5622	28.5139	4.5077	28.1736	1.9931
609.7	4.4041	27.5255			
607.6	4.5570	28.4814			
804.3	4.5091	28.1819	4.4732	27.9574	1.4160
815.5	4.4000	27.5003			
797.2	4.5104	28.1900			
1503.6	4.5309	28.3179	4.5008	28.1302	1.3238
1495.0	4.4322	27.7013			
1514.9	4.5394	28.3713			
1783.1	4.5187	28.2418	4.4833	28.0207	1.3407
1821.7	4.4139	27.5869			
1825.1	4.5173	28.2333			

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