

MultiTek® Nitrogen in Food by Chemiluminescence

- **Rapid and Accurate Nitrogen Determination in Food Matrices**
- **Excellent Sensitivity and Stability**
- **No Sample Preparation**

Keywords:

MultiTek®, Chemiluminescence, Nitrogen, Combustion

INTRODUCTION

The analysis of total nitrogen can be utilized in the food industry. Food producers can determine the amount of nitrogen in the intermediate or final products. By monitoring the amount of nitrogen in their products, manufacturers can evaluate production quality.

The principle of operation for nitrogen analysis begins with the complete, high temperature oxidation of the entire sample matrix. The sample is combusted with oxygen at a temperature of 1050°C.

The combustion gases are routed through a membrane drying system to remove all water and then to the nitrogen detector module for quantization.



NO* is reacted with O₃ (ozone), produced by an onboard ozone generator, to form NO₂* (metastable nitrogen dioxide). As the metastable species decays, a photon of light is emitted at specific wavelengths and detected by a photomultiplier tube (PMT).



EXPERIMENTAL CONDITIONS

- **Instrumentation**

Antek MultiTek® Horizontal Nitrogen, Antek Model 735 Syringe Drive, Antek Model 740.



- **Instrument Parameters**

Sample Mass (mg)	~20
GFC 1- Ar/He (ml/min)	130
GFC 2- Pyro O2 (ml/min)	450
GFC 3- Ozone O2 (ml/min)	35
GFC 4- Carrier O2 (ml/min)	25
Furnace (°C)	1050
Nitrogen PMT voltage	600
Model 735 Speed	1950

APPLICATION NOTE



The MultiTek® software Timed Events table, figure 1, allows the user to control the Model 735 Syringe Drive and the sample combustion process.

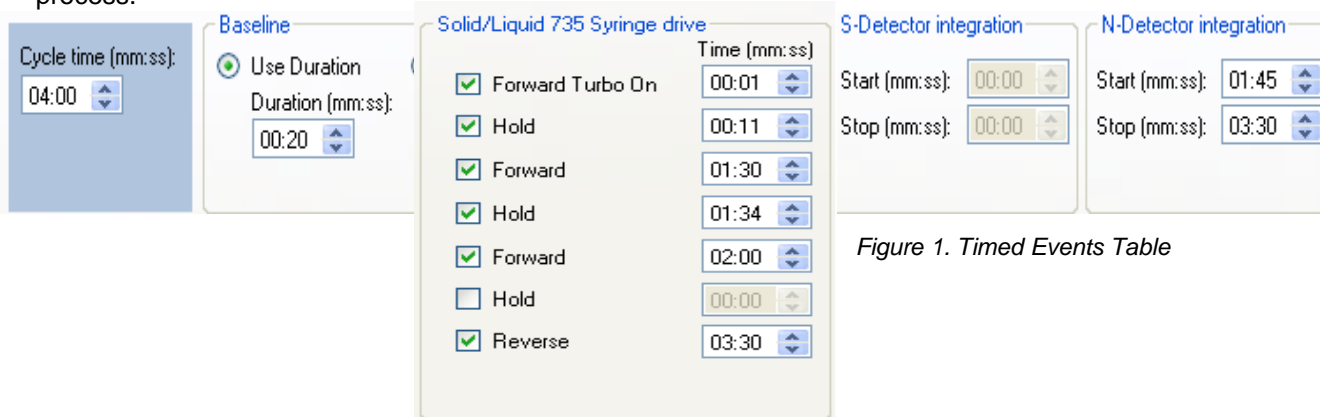


Figure 1. Timed Events Table

• Calibration Curve

Calibration was performed by analyzing nitrogen in polymer standards ,10-250 ppm as shown in figure 2.

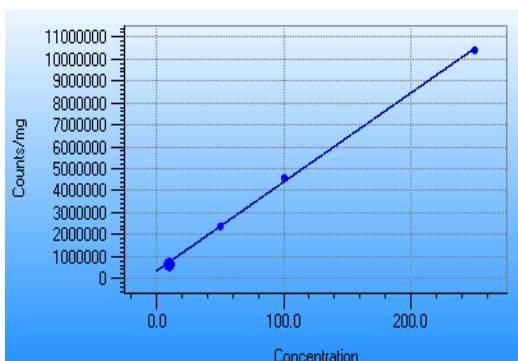


Figure 2. Calibration Results for Nitrogen
Correlation = 0.999

• Sample Results

The nitrogen in the samples is correlated to the amount of protein in the food manufacturing process to monitor the process efficiency.

Name	Concentration	Counts	Counts/Weight	Weight	%RSD
Sample 1	80	71980732	3569319		2.84
	82	74653189	3677497	20.3	
	79	70368447	3553962	19.8	
	77	70920559	3476498	20.4	
Sample 2	89	79363296	3947347		1.81
	90	82048503	4002366	20.5	
	90	80253731	3972957	20.2	
	87	75787653	3866717	19.6	
Sample 3	36	37459904	1805463		6.90
	34	34451988	1705544	20.2	
	35	37079910	1765710	21.0	
	40	40847814	1945134	21.0	
Sample 4	41	40611269	1987357		4.59
	42	42888976	2061970	20.8	
	38	38654472	1885584	20.5	
	41	40290360	2014518	20.0	
Sample 5	36	36752459	1816852		5.87
	37	35896355	1822150	19.7	
	34	35176601	1707602	20.6	
	39	39184422	1920805	20.4	

• Sample 1

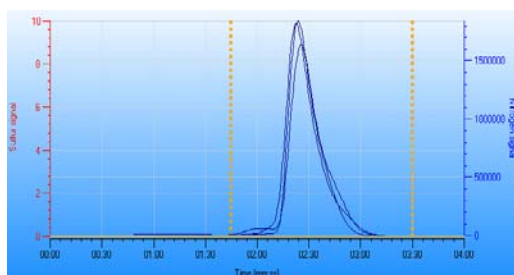


Figure 3. 80 ppm overlay

CONCLUSION

The MultiTek® Analyzer demonstrates the ability to accurately determine the total nitrogen content in food. The analysis allows the user to monitor the production process of intermediate and final products. For analysis of protein content, a conversion factor can be used to convert total nitrogen to total protein much more quickly than with Kjeldahl and without the toxic waste generation.

The Antek® MultiTek® is the only instrument on the market that combines sulfur, nitrogen, and halides analysis all in one. Compact, powerful, automated, and able to analyze gas, liquid, or solid samples, it's the perfect solution to today's increasing demand worldwide for fast, accurate detection and analysis of contaminants, and corrosive elements. Because MultiTek® delivers precise results with high sensitivity and unmatched versatility, it's a valuable process optimization tool that will deliver faster ROI and a better bottom line.



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