

## MultiTek® Nitrogen in Fuel Oil by Chemiluminescence

- Rapid and Accurate Determination of Chemically Bound Nitrogen
- Excellent sensitivity and stability
- Exceeds regulatory limits of compliance

### Keywords:

**MultiTek, Chemiluminescence, Nitrogen, Fuel Oil, ASTM D5762**



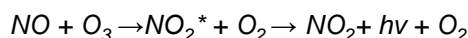
### INTRODUCTION

The analysis of total nitrogen can be utilized in the refining industry to monitor the hydrotreating process and protect the expensive catalyst. 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 sulfur detector module for quantitation.



Nitric oxide is reacted with ozone (O<sub>3</sub>), produced by an onboard ozone generator, to form NO<sub>2</sub><sup>\*</sup> (metastable nitrogen dioxide). As the metastable species decays, photons are emitted at a specific wavelength range and detected by a photomultiplier tube (PMT).



### EXPERIMENTAL CONDITIONS

#### Instrumentation

Antek MultiTek Horizontal Nitrogen with Model 735 Syringe Drive, Model 740 MultiMatrix, and Model 748 or 758 Autosampler

### Instrument Parameters

Sample Volume (µl)	5
GFC 1- Ar/He (ml/min)	130
GFC 2- Pyro O <sub>2</sub> (ml/min)	450
GFC 3- Ozone O <sub>2</sub>	35
GFC 4- Carrier O <sub>2</sub> (ml/min)	25
Furnace (°C)	1050
Nitrogen PMT voltage (V)	700
Model 735 Speed	1800

### Calibration

The calibration was performed as per ASTM D5762 using nitrogen as acridine in xylene standards in the range of 0-100 ng/µl.

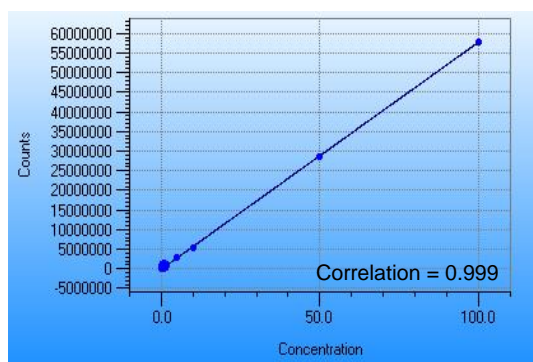


Figure 1. Calibration Results for Nitrogen

Calibration data was used to determine the limit of detection (LOD) defined as 3σ. The LOD is calculated to be 602 ppb nitrogen for this calibration range.

## REPEATABILITY and STABILITY

### Sample Results

Concentration (mg/kg)	Counts	% RSD
617	15541006	1.06
617	15549342	
619	15605936	
625	15755779	
624	15714722	
615	15506222	
619	15604985	
604	15209154	
609	15334174	
620	15616433	
616	15513315	

The MultiTek shows excellent repeatability and stability as demonstrated below. These injections of the fuel oil sample demonstrate both accuracy and precision.

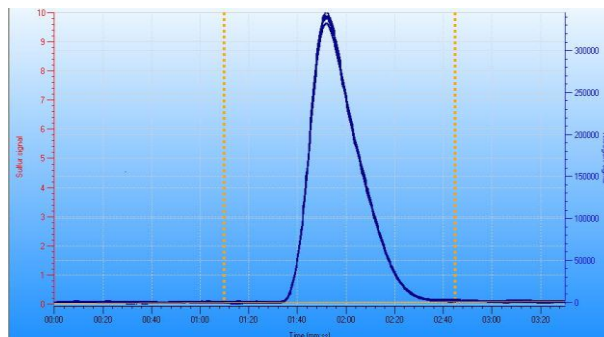


Table 1. Fuel Oil Sample table

Figure 2: Fuel Oil Sample (10 injections)

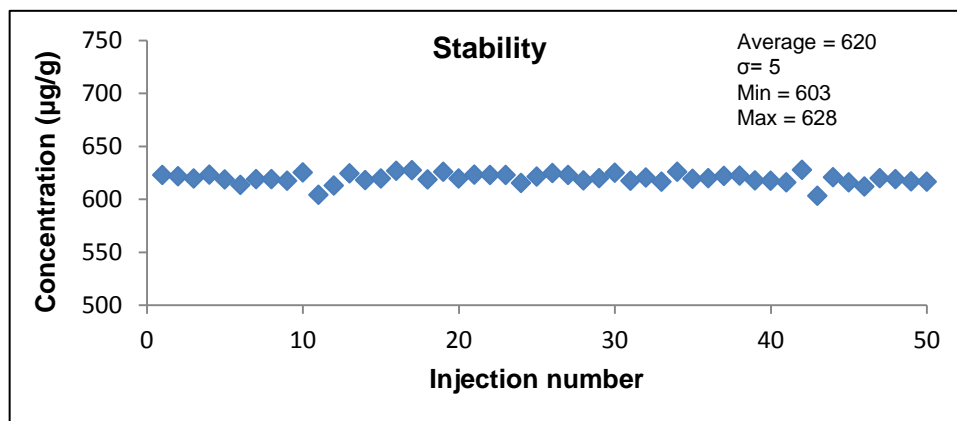


Figure 3 : Long term repeatability test of fuel oil sample

## CONCLUSION

The MultiTek Analyzer demonstrates the ability to accurately determine the total nitrogen in fuel oil. The analysis allows the user to monitor the production process of intermediate and final products and protect the expensive catalysts used in refining processes.

*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.*