

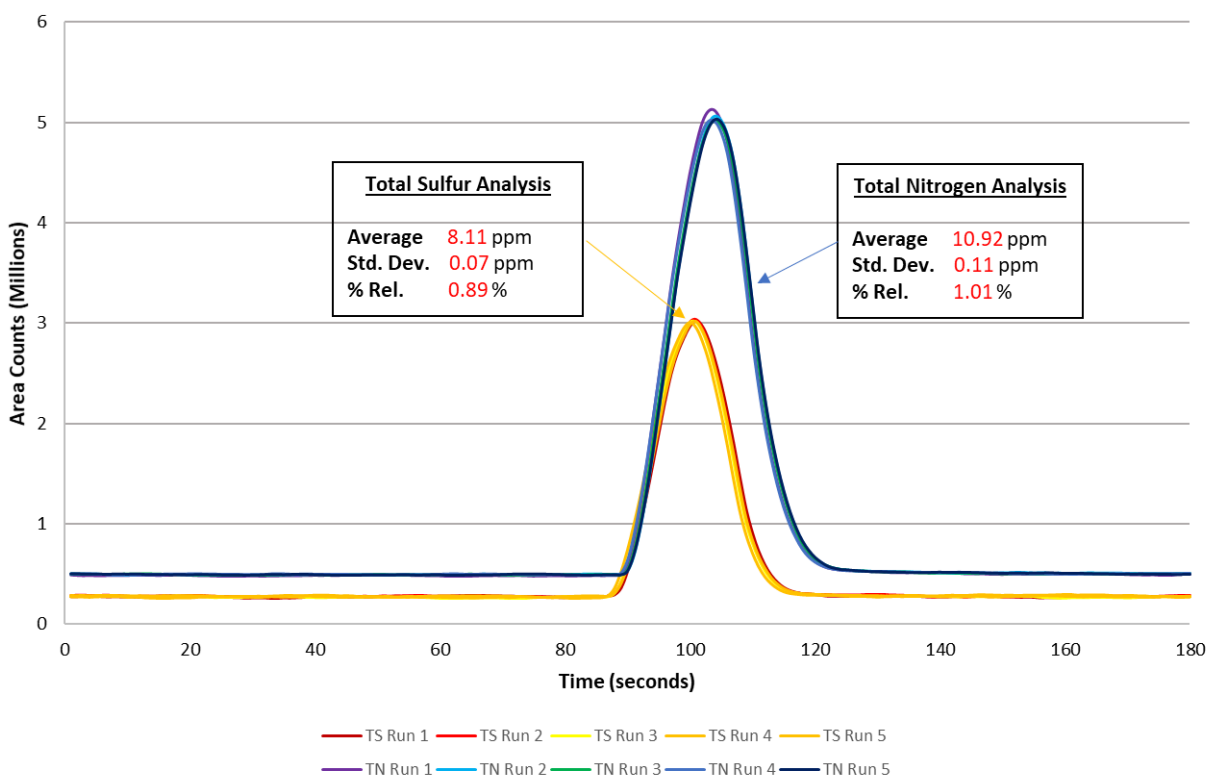
## Total Sulfur and Total Nitrogen in Fuels and Chemicals

Regulatory agencies around the world have been implementing increasingly stricter fuel emissions guidelines over the past decades to limit air pollution. Regulations such as the American **Tier III**, European **Euro 6** or the Indian **Bharat VI** set quantitative limits on the permissible amount of specific pollutants that can be released during combustion. **Sulfur and Nitrogen** are both controlled under these regulations due to the health and environmental impact of their oxides: Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Oxide (NO) and Nitrogen Dioxide (NO<sub>2</sub>), commonly referred to as NO<sub>x</sub>.

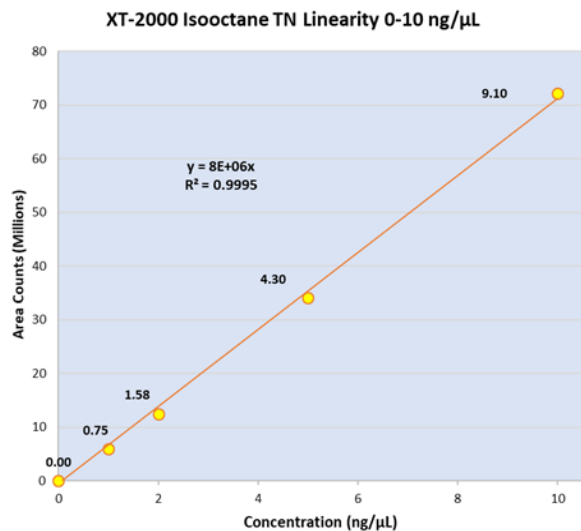
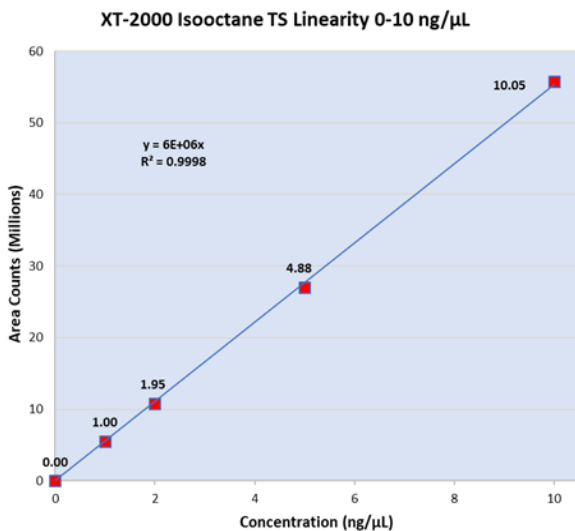
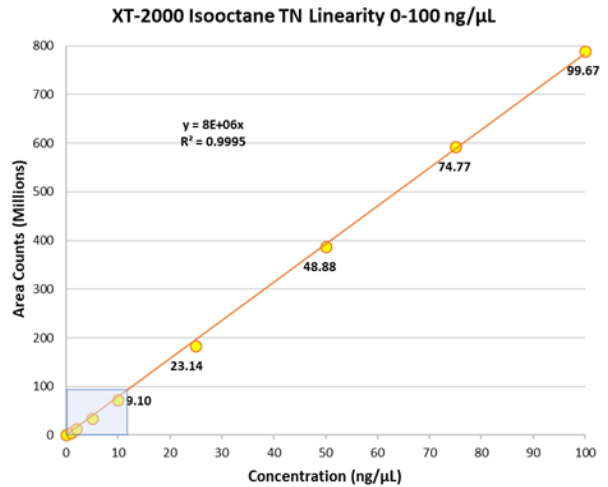
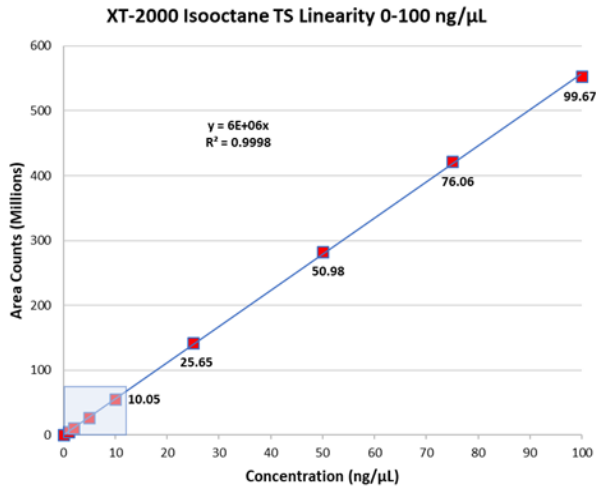
In order to measure sulfur and nitrogen content in fuels, chemicals and petrochemicals, ATOM designed the **XT-2000** laboratory analyzer for both Total Sulfur (TS) and Total Nitrogen (TN) measurements. The XT-2000 utilizes patented **Excimer UV Fluorescence (EUVF)** technology for TS measurement and proprietary **Chemiluminescence (CL)** technology for TN measurement offering exceptional sensitivity that **does not require a vacuum pump** minimizing maintenance requirements and improving analytical stability. The XT-2000 provides accurate, precise and fast analysis for a broad range of samples with a typical **analysis time of 3 minutes** or less.

The XT-2000 demonstrates outstanding linearity for 0-100 ng/μL TS/TN in isooctane standards with excellent **0.9998 and 0.9995 correlation** for both TS and TN measurements. Results for various fuels and chemicals presented on the following page show TS and TN content from ppb level to 31.45 ppm/wt (TS) / 12.48 ppm/wt (TN). All samples were analyzed 5 times with an **RSD of 2% or better** for samples above 1 ppm. The XT-2000 provides outstanding repeatability, stability and reliability for both Total Sulfur and Total Nitrogen measurements.

### ULSD Total Sulfur and Total Nitrogen Analysis



Sample	Concentration (ppm), SD (ppm) and Relative SD (%)					
	TS	SD	%RSD	TN	SD	%RSD
RFG 1	10.44	0.011	1.10	7.72	0.016	2.05
RFG 2	31.45	0.128	0.41	8.07	0.068	0.84
RFG 3	5.01	0.053	1.06	4.52	0.060	1.33
ULSD 1	0.62	0.034	5.42	0.56	0.029	5.20
ULSD 2	6.40	0.043	0.67	0.95	0.032	3.40
ULSD 3	0.94	0.020	2.16	12.48	0.195	1.56
ULSD 4	8.11	0.072	0.89	10.92	0.111	1.01
ULSD 5	5.91	0.038	0.64	10.50	0.097	0.92
Toluene (Technical Grade)	2.06	0.034	1.67	0.41	0.007	1.74
Xylene (Technical Grade)	0.34	0.022	6.53	0.40	0.014	3.53
Acetone (Technical Grade)	0.07	0.027	38.52	0.33	0.084	25.52
Methanol (Technical)	0.11	0.044	38.26	0.42	0.015	3.57



■ Average Total Sulfur Concentration    — TS Calibration Curve

● Average Total Nitrogen Concentration    — TN Calibration Curve