

Analysis of Tobacco Specific Nitrosamines in Electronic Cigarette Liquid

by LCMSMS

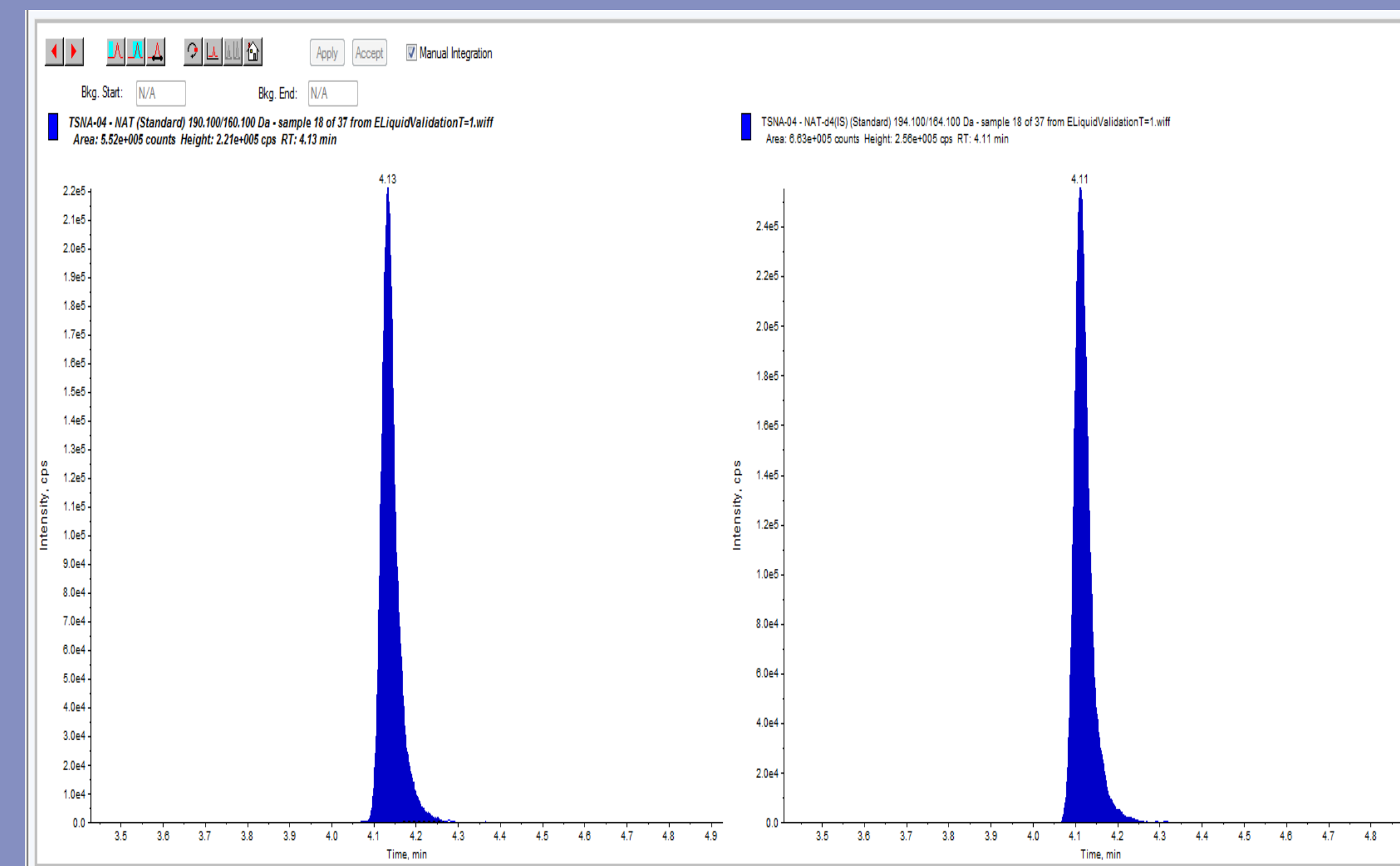
Nolan Spann, Angela Seamans, Carl J. Adams, Salem Chouchane
Eurofins Lancaster Laboratories Professional Scientific Services

ABSTRACT

A new method was needed to analyze low-level TSNA concentrations in electronic cigarette liquid. This proved difficult with the various flavored matrices, however the method was developed to accurately quantitate TSNA as low as 50 pg/mL for N-nitrosornicotine (NNN), 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK), N-nitrosoanatabine (NAT); concentrations of N-nitrosoanabasine (NAB) are accurately quantified at 10 pg/mL. An Agilent 1290 Infinity II LC paired with an AB Sciex 6500+ Mass Spectrometer were used for analysis. Chromatographic separation was achieved using a Phenomenex® Gemini® 3µm C18, 110Å 150 x 2 mm column. This method has been validated and the results will be presented.

CHROMATOGRAPHY

Representative Mid-Level Standard w/ ISTD



ANALYTICAL FIGURES OF MERIT

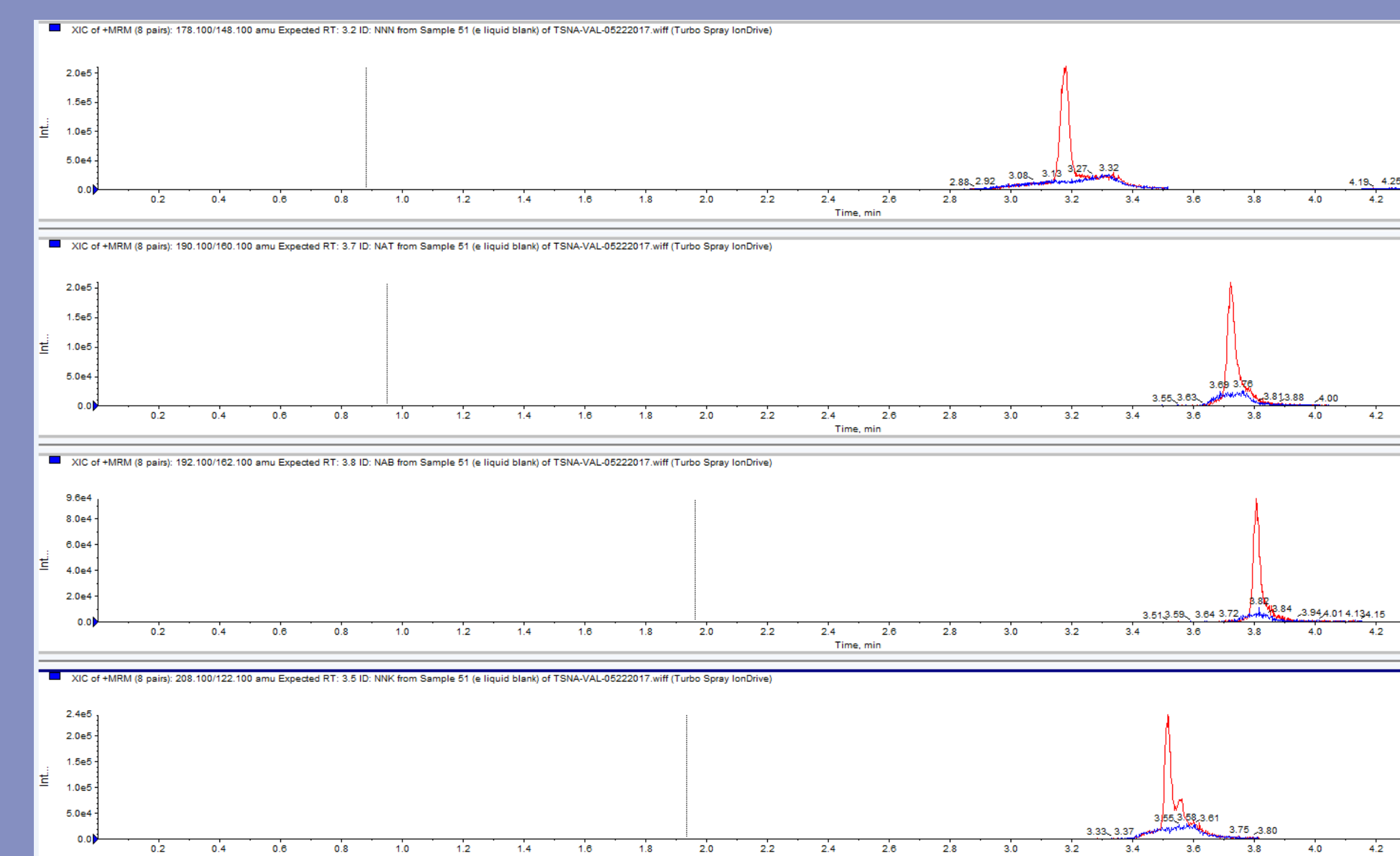
	NNN	NAT	NAB	NNK
Linearity (r ²)	0.9998	1.0000	1.0000	0.9998
Accuracy	82%	82%	81%	83%
Precision	101%	98%	97%	98%
LOD (ng/mL)	0.01	0.02	0.003	0.02
LOQ (ng/mL)	0.04	0.05	0.01	0.05
Range (ng/mL)	0.04 to 30.0	0.05 to 30.0	0.01 to 7.5	0.05 to 30.0
Sample Stability	24 hours at ~ 5°C			
Standard Stability	16 days at ~ 5°C			

INSTRUMENT PARAMETERS

LC	Agilent 1290 Infinity II
Detector	AB Sciex API6500+
Column	Phenomenex Gemini C18 (110Å, 1.6µm, 2mm x 150 mm)
Mobile Phase A	10 mM Ammonium Formate/ 5% ACN
Mobile Phase B	0.2% Formic Acid in ACN
Flow Rate	0.6 mL/min
Injection Volume	5 µL

CHROMATOGRAPHY

Overlay of Matrix Blank with E-Liquid Sample



CONCLUSION

We have developed and validated an effective extraction procedure and analysis method for low-level concentrations of TSNA in electronic cigarette liquid. This method allows the accurate quantitation of TSNA present at levels approximately 20x lower than pre-existing methods used for determining TSNA in tobacco and combustible matrices.