



CORESTA

Report to ISO/TC126/SC3

Dr Stéphane Colard, Secretary General

December 16, 2020

CORESTA is a non-profit organisation. Its purpose is to promote cooperation in scientific research relative to tobacco and its derived products.



Electronic Cigarettes: CORESTA Working Groups

❖ Several working groups conduct scientific projects relative to electronic cigarettes

- PUB / Product Use Behaviour
- CROM / Consumer Reported Outcome Measures
- BMK / Biomarkers
- NGTX / 21st Century Toxicology for Next Generation Tobacco and Nicotine Products
- **EVAP / E-Vapour** **Focus today**

Activity Reports publicly available on CORESTA website



E-Vapour SG Scope and Membership

❖ Objectives:

- To identify areas of scientific research and conduct studies that will characterize liquids, e-vapour product emissions, and device properties and performance
- To develop and publish methods and guides
- To organize and conduct periodic proficiency/collaborative studies of identified constituents in liquids and/or e-vapour product aerosol

❖ SG membership

- ≈ 50 people from US, EU, Asia
- E-Vapour Product Companies, Suppliers, Contract Labs, Regulatory Agencies, Academia, Others,



❖ Recent accomplishments

- **May 20:** Technical Report on Metals Analysis Method for E-liquids published on the CORESTA website
- **Nov 20:** Collaborative Study for the Determination of Formaldehyde & Acetaldehyde in E-Vapour Prod.
- **Nov 20:** Technical Guide for Setting Method LOD and LOQ Values for the Determination of Metals in E-Liquid and E-Vapour Aerosol by ICP-MS



- ❖ **Reference device**
- ❖ **Carbonyls in aerosol**
- ❖ **Metals LOD / LOQ**
- ❖ **Degradants in e-liquid**



Reference Device Study



Reference Device

❖ Method Selection

- CRM 81 and CRM 84

❖ Study Protocol

- **Harmonized Device: Aspire Tank and Evolv DNA power supply**
- **Compounds included: nicotine, propylene glycol, glycerin and water**
- **Three e-liquids: unflavored, tobacco and menthol**
- **Study extended to allow maximum participation: 11 Labs**



Reference Device

- Proposed reference device produced aerosol with an average Reproducibility (R) of **34 %**
- Average %R for PG was **17.5 %**, normalized to ACM
- Average %R for Glycerin was **16.2 %**, normalized to ACM
- Average %R for Nicotine was **15.6 %**, normalized to ACM
- Agreement to recommend this device as a reference product
- Technical Report to be published end 2020



Carbonyls in Aerosol - Method



Carbonyls in Aerosol

Method Selection: **HPLC with DNPH**

Study Protocol

- Harmonized Device: **Aspire Tank and Evolv DNA power supply**
- Compounds included: **formaldehyde and acetaldehyde**
- Three e-liquids, **unflavored, tobacco and menthol**
- Samples **fortified at three levels** (0, 15, 25 and 35 $\mu\text{g}/\text{ml}$) immediately before analysis
- Aerosol samples collected using **55/3/30 CORESTA CRM 81 puffing regime**
- Collected **~300 mg** of aerosol per liquid and spiking level, in triplicate



Carbonyls in Aerosol

Why use fortified e-liquids?

- The native production of formaldehyde and acetaldehyde is expected to be both low and variable in the un-spiked aerosol, based on pre-study work.
- Formaldehyde and acetaldehyde added to e-liquids will transfer into the aerosol, based on pre-study work.
- **Assumption**: Adding a known amount of formaldehyde and acetaldehyde to the native amount produced by each device should improve the consistency of measurements and correct for device to device differences.



Carbonyls in Aerosol - Results

- Fortified e-liquids reduced the Repeatability (r) and Reproducibility (R) Limits for the study
- Average %R for formaldehyde was **52 %**, at **35 µg/g** fortification level
- Average %R for acetaldehyde was **111 %**, at **25 µg/g** fortification level
- Draft CRM is in preparation; publication early 2021



Metals LOD/LOQ



❖ Observations

- Filter pad-based trapping systems contain some analytes of interest.
- Other trapping system may also contain some analytes of interest.
- Reported values are impacted by trapping system.

❖ Technical Guide publication expected by end of 2020

- Recommend best practice for determining method LOD/LOQ values.
- Recommend best practice to handle contribution from trapping system.



Nicotine Degradants* in E-liquids: Proficiency Study

***Anabasine, Anatabine, β -Nicotyrine, Cotinine, Myosmine, NicotineN'-Oxide, Nornicotine**



Nicotine Degradants

- **Proficiency Study: laboratories use their in-house methods**
- **Samples: 9 total**
 - **4 e-liquids: aging or fortified with target compounds**
- **Report z-scores and method synopses**
- **Technical Report published in September 2020**



Projects, reports, documents, ... are publicly available

Abstracts & Presentations

~ 9000 abstracts/presentations

www.coresta.org

Technical Reports

Cooperation Centre for Scientific Research Relative to Tobacco
Centre de Coopération pour les Recherches Scientifiques Relatives au Tabac

Home → Abstracts → A non-destructive rapid method for blend grade verification using visible-near infrared hyperspectral imaging, advanced data processing and classification algorithms

CORESTA Congress, Kunming, 2016, Agronomy/Phytopathology Groups, AP 18

A non-destructive rapid method for blend grade verification using visible-near infrared hyperspectral imaging, advanced data processing and classification algorithms

SAHU A.(1); DANTE H.(2); MORRIS J.W.(1); WAREK U.(1)

(1) Altria Client Services LLC., Biotechnology, Richmond, VA, U.S.A.; (2) Industrial Turnaround Corporation, Chester, VA, U.S.A.

The main objective of this study was to investigate the potential of hyperspectral imaging as a non-destructive, rapid, quality control method for grading cured tobacco bales. Cultivated tobacco plants were harvested and cured. Cured tobacco bales were brought to the stemmery and mixed into blend grades. Blend grades were then graded traditionally based on visual, physical and sensory characteristics. Hyperspectral images of cured tobacco bales were acquired using a visible near-infrared (VNIR) hyperspectral pushbroom imaging system (400-1000 nm). Multivariate calibration models were built using end-member extraction and linear discriminant analysis (LDA). The LDA model using Mahalanobis distance metric showed clear discrimination between the different tobacco grades. The relative classification accuracy of this method for flue-cured and Burley tobacco grades was 93 % versus the traditional grading method. This study demonstrates that hyperspectral imaging can be used as a reliable, rapid, non-destructive quality control method for grading cured tobacco bales.

Documents
Presentation

Presentations, posters and manuscripts have not been peer-reviewed. Their content engages only the authors and is not the responsibility of CORESTA.

Authors
SAHU A. DANTE H. MORRIS J.W. WAREK U.

Organisations
Altria Client Services
Industrial Turnaround Corporation

Cooperation Centre for Scientific Research Relative to Tobacco

Agro-Chemical Advisory Committee

CORESTA Guide N° 19
Responsible Use of Crop Protection Agents (CPAs) in Tobacco Leaf Production

April 2017

Author
H.D. Papadimitrakis, A. L...

Guides

Cooperation Centre for Scientific Research Relative to Tobacco

Tobacco and Tobacco Products Analytes Sub-Group

CORESTA Recommended Method No. 91

DETERMINATION OF 15 PAHs IN TOBACCO AND TOBACCO PRODUCTS BY GC-MS/MS or GC-MS

April 2019

Methods

Cooperation Centre for Scientific Research Relative to Tobacco
Centre de Coopération pour les Recherches Scientifiques Relatives au Tabac

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Low Nicotine Tobacco
Agronomic Production Practices

0.4 %
0.3 %
0.2 %
0.1 %
0.09 %
0.08 %

Vision
To be recognised by our members and relevant external bodies as an authoritative source of publicly available, credible science and best practices related to tobacco and its derived products.

→ More about CORESTA

News
CORESTA Residue Field Trials Sub-Group Poster Presentations at University of Kentucky Burley Tour, August 2019 published [RFT-235-CXP] 17/09/2019

Latest Documents
Guides
No. 26 - Technical Guide for Designing E-Vapour Product Stability Studies 05/09/2019

Upcoming Meetings
5 October 2019
SG SMA - Smoke Analytes Hamburg, Germany
5 October 2019

Abstract No.
Oral Presentation
Abstract ID
ST 03

1684

Method development for the analysis of mono-carbonyl compounds in e-vapor products by LC-MS

ZHU J.; HEREDIA A.; TWEEDY J.; TAYYARAH R.

ITG Brands and Fontem USA, P.O. Box 21688, Greensboro, NC 27420, U.S.A.
ST 04

1785

Method optimization on analysis of TSNA in electronic cigarette liquids and N-nitrososarcosine (NSAR) in smokeless tobacco by UHPLC-MS/MS

WU J.; QIN F.

PerkinElmer Health Sciences Canada, Inc., 501 Rowntree Dairy Road, Unit 6, Woodbridge, Ontario L4L 8H1, Canada
ST 05

1814

Determination of glycidol in e-liquids and emissions from e-cigarettes

WANG J.; RODRIGUEZ-LAFUENTE A.; JOZA P.

Labstat International Inc., 262 Manitou Drive, Kitchener, Ontario N2C 1L3, Canada
Abstract No.
Poster Presentation
Abstract ID
STPOST 05

1663

A screening method by gas chromatography–mass spectrometry for the quantitation of 33 aerosol constituents from a heat-not-burn tobacco product

HOFER I.; GAUTIER L.; CORTES SAUTEUR E.; DOBLER M.; PYTHON A.; O'REILLY C.; GISI D.; TINGUELY E.; WEHREN L.; GARCÍA FIDALGO E.; CUKURCAM L.; HENNEMANN M.; MATERA R.; ROTA D.; SANTOS CH.; SEQUEIRA C.; EPARS T.

Philip Morris Products S.A., PMI R&D, Quai Jeanrenaud 5, CH-2000 Neuchatel, Switzerland
STPOST 06

1711

Assessment of filter pre-treatment for metal analysis in e-vapour aerosol

IMAI R.; NAGAE H.; FUKAI Y.; SHIMAZU A.; TAKAYAMA H.

Japan Tobacco Inc., Scientific Product Assessment Centre, 6-2, Umegaoka, Aoba-ku, Yokohama, Kanagawa 227-8512, Japan
STPOST 07

1798

New developments in vacuum photoionisation TOF-MS technique to analyse smoking products on-line and in real time

EHLERT S.(1,2); HEIDE J.(2); WALTE A.(1); ZIMMERMANN R.(2)

(1) Photonion GmbH, Hagenower Str. 73, 19061 Schwerin, Germany

(2) University of Rostock, Dept. of Analytical Chemistry, Dr.-Lorenz-Weg 2; 18059 Rostock, Germany

STPOST 08

1815

Determination of α -tocopherol acetate (vitamin E acetate) in e-liquids and cannabis liquids samples - a comparison between HPLC-DAD and LC-MS/MS methods

RODRIGUEZ-LAFUENTE A.; JOZA P.

Labstat International Inc., 262 Manitou Drive, Kitchener, Ontario N2C 1L3, Canada

 Publicly available on www.coresta.org



Thank you for your attention