

**Certificate of Analysis No. : 1629469B**

**Customer**

BRAIMIOTIS - P. SCARLATOS Ltd  
144, 3rd SEPTEMVRIOU  
11251 ATHENS

Attn.: Mr GOROGIAS

Date of issue: 9/11/2016

**Sample information**

Sample kind :	Parts of Electronic cigarette
Sample identification :	G14 Clearomizer (D-ATG14-161018-006) / OCC Coil Cylinder 1,6 Ohm (D-COCC-161018-006) / 5Pin Compact Battery (D-MCOMP-161018-006), prod/imp.: JFT Co, Ltd.1209, Seoulsoop SK-V1 Tower,5,Seongsuilro 8-gil, Seongdong-gu,Seoul, KOREA 04793
Received on :	20/10/2016 2:10:00 p.m.
Packaging :	---
Seals :	None
Temperature :	Ambient
Condition on receipt :	Normal

**Sampling information**

Sampling responsible :	Customer
Date :	---
Location :	---
Point :	---
Method :	---

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**Analysis result**

Date of analysis : 26/10/2016 – 2/11/2016

PARAMETER	METHOD	UNITS	RESULT	LIMITS
<b>E-cigarette emission testing</b>			.	
<b>Emission protocol</b>			.	
<b>E-liquid</b>			<b>Reference B (AFNOR XP D 90-300-3)</b>	
<b>MOD</b>			<b>5Pin Compact Battery</b>	
<b>Atomizer</b>			<b>G14 Clearomizer</b>	
<b>Atomizer head/coil</b>			<b>OCC Coil Cylinder 1,6 Ohm</b>	
<b>Coil Composition</b>			<b>Cr20Ni80</b>	
<b>Battery type</b>			<b>li-ion</b>	
<b>Battery capacity</b>		<b>mAh</b>	<b>900</b>	
<b>Wattage</b>		<b>W</b>	<b>7,87</b>	
<b>Voltage</b>		<b>V</b>	<b>3,55</b>	
<b>Device Airflow</b>		<b>on/off</b>	<b>full ON</b>	
<b>Puff duration</b>		<b>sec</b>	<b>3</b>	
<b>Puff interval (frequency)</b>		<b>sec</b>	<b>30</b>	
<b>Puffs per set</b>		<b>unit</b>	<b>20</b>	
<b>Set number</b>		<b>unit</b>	<b>5</b>	
<b>Puff number</b>		<b>unit</b>	<b>100</b>	
<b>Aspiration Airflow</b>		<b>l/min</b>	<b>1,1</b>	
<b>Puff volume</b>		<b>ml</b>	<b>55</b>	
<b>Vapor temperature at mouthpiece outlet</b>		<b>°C</b>	<b>&lt;60</b>	
<b>Inclination angle of e- cigarette tank</b>		<b>°</b>	<b>45</b>	
<b>Emissions</b>			.	
<b>Nicotine</b>	* GC/FID	<b>mg / 100 puffs</b>	<b>4,0</b>	-
<b>Diethylene glycol</b>	* GC/FID	<b>µg / 200 puffs</b>	<b>Not detected</b>	LOD=500 -
<b>Formaldehyde</b>	* Coresta GC/MS	<b>µg / 200 puffs</b>	<b>18</b>	-
<b>Acetaldehyde</b>	* Coresta GC/MS	<b>µg / 200 puffs</b>	<b>5,2</b>	-
<b>Acrolein</b>	* Coresta GC/MS	<b>µg / 200 puffs</b>	<b>Not detected</b>	LOD=2 -

*The analysis results refer only to the items tested*

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*(\*)Method out of the scope of accreditation*

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**Analysis result**

Date of analysis: 26/10/2016 – 2/11/2016

PARAMETER	METHOD	UNITS	RESULT	LIMITS
<b>Crotonaldehyde</b>	* Coresta GC/MS	µg / 200 puffs	<b>Not detected</b>	LOD=2 -
<b>TSNA: NNN</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=0,04 -
<b>TSNA: NNK</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=0.04 -
<b>Toluene</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=0.5 -
<b>Benzene</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=0.5 -
<b>1,3- Butadiene</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=1 -
<b>Isoprene</b>	* British American Tobacco	µg / 200 puffs	<b>Not detected</b>	LOD=1 -
<b>Diacetyl</b>	* Coresta GC/MS	µg / 200 puffs	<b>Not detected</b>	LOD=2 -
<b>Acetyl Propionyl</b>	* Coresta GC/MS	µg / 200 puffs	<b>Not detected</b>	LOD=2 -
<b>Cadmium</b>	* GF-AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0.004 -
<b>Chromium</b>	* GF-AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0.08 -
<b>Copper</b>	* GF-AAS	µg / 200 puffs	<b>&lt;0,80</b>	-
<b>Lead</b>	* GF-AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0.3 -
<b>Nickel</b>	* GF-AAS	µg / 200 puffs	<b>0,66</b>	-
<b>Arsenic</b>	* Hydride / AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0.07 -
<b>Mercury</b>	* Hydride / AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0.02 -
<b>Tin</b>	* GF-AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0,8 -
<b>Antimony</b>	* Hydride / AAS	µg / 200 puffs	<b>Not detected</b>	LOD=0,13 -

LOD: Limit of detection

For  
A. TSAKALIDIS Inc.

A. TSAKALIDIS  
Managing Director

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## APPENDIX A

### SAMPLE'S PHOTOGRAPH

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## APPENDIX B

### CHROMATOGRAMS

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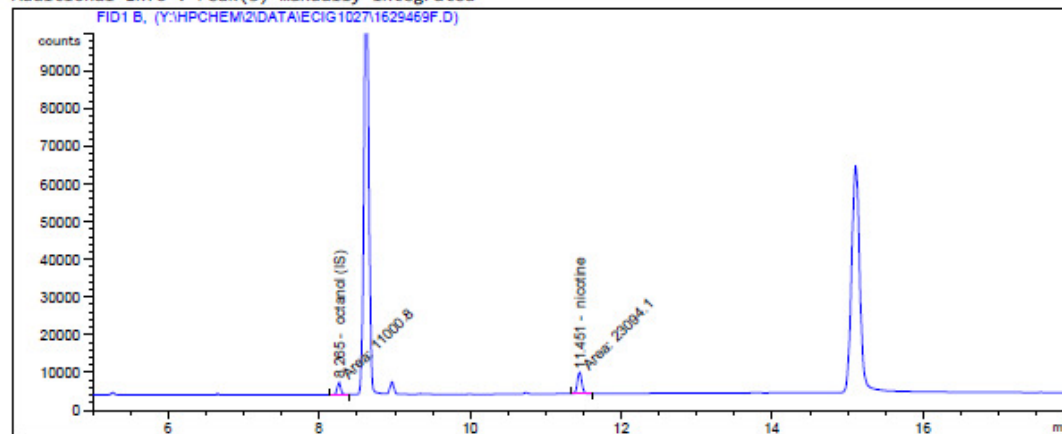
### 1. Nicotine- Diethylene glycol

Data File Y:\HPCHEM\2\DATA\ECIG1027\1629469F.D  
 Sample Name: 1629469f

```
=====
Acq. Operator   : drillia                      Seq. Line : 37
Acq. Instrument : Instrument 2                  Location  : Vial 37
Injection Date  : 29/10/2016 9:25:01 µµ        Inj       : 1
                                           Inj Volume: 1 µl

Acq. Method     : C:\HPCHEM\2\METHODS\ECIGAR.M
Last changed    : 28/10/2016 4:50:39 µµ by drillia
Analysis Method : C:\METHODS (PROS) FID\ECIGAR2.M
Last changed    : 10/11/2016 3:15:51 µµ
                  (modified after loading)
Method Info     : GC5 HP wax
=====
```

Additional Info : Peak(s) manually integrated



#### Area Percent Report

```
=====
Sorted By      : Signal
Calib. Data Modified : 10/11/2016 3:15:51 µµ
Multiplier     : 1.0000
Dilution       : 1.0000
Use Multiplier & Dilution Factor with ISTDs
=====
```

Signal 1: FID1 B,

Peak #	RetTime [min]	Type	Width [min]	Area counts*s	Area %	Name
1	8.265	MM	0.0534	1.10008e4	32.26530	octanol (IS)
2	11.451	MM	0.0690	2.30941e4	67.73470	nicotine
3	12.054		0.0000	0.00000	0.00000	diethylen

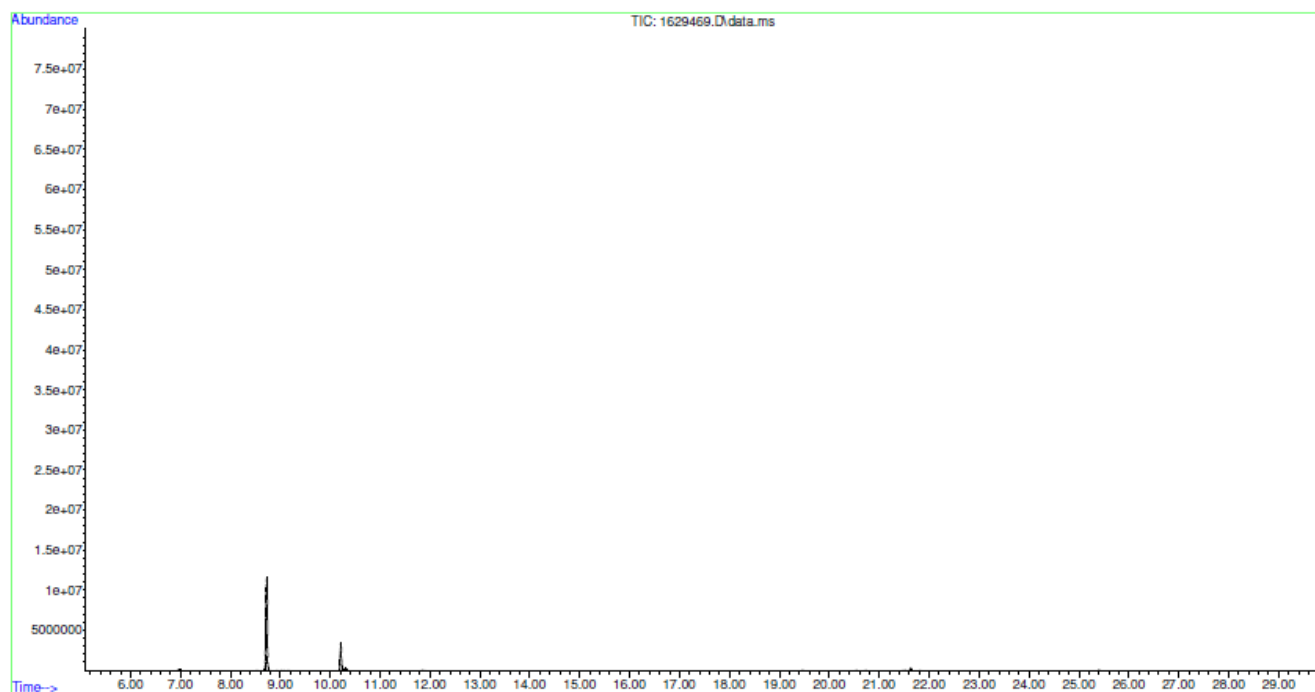
Totals : 3.40950e4 100.0000



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2. Diacetyl & acetyl propionyl

File : D:\MassHunter\GCMS\1\data\ecigarette 2016 11 01\1629469.D  
Operator :  
Acquired : 02 Nov 2016 07:00 using AcqMethod carbonylssim2.M  
Instrument : 5977A  
Sample Name: 1629469  
Misc Info :  
Vial Number: 5





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### 3. Nitrosamines

#### Quantify Sample Report      MassLynx 4.1

Dataset:      Untitled

Last Altered:    Thursday, November 03, 2016 10:08:13 GTB Standard Time

Printed:          Thursday, November 03, 2016 10:08:23 GTB Standard Time

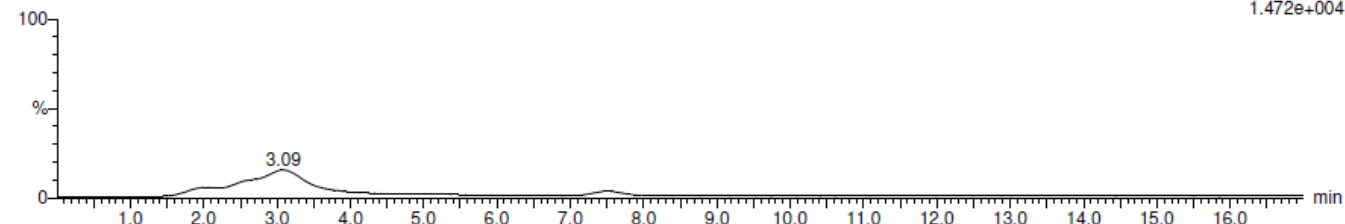
Method: C:\MassLynx\Default.pro\Methdb\nitrosamines.mdb 02 Sep 2016 12:57:18

Calibration: No Calibration

#### NNN

1629469  
1629469

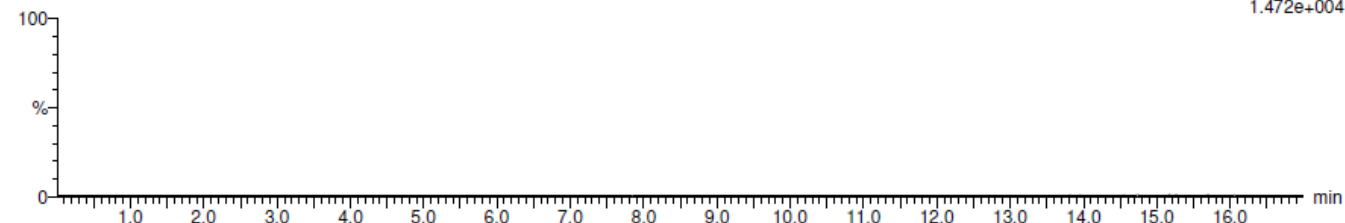
MRM of 8 channels, ES+  
178.4>148.5  
1.472e+004



#### NNK

1629469  
1629469

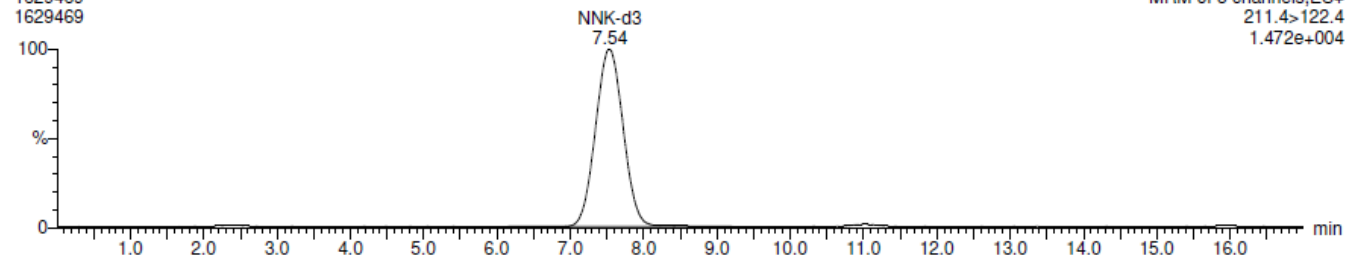
MRM of 8 channels, ES+  
208.5>122.6  
1.472e+004



#### NNK-d3

1629469  
1629469

MRM of 8 channels, ES+  
211.4>122.4  
1.472e+004



#	Name	Trace	RT	Area	Response
1	NNN	178.4>148.5			
3	NNK	208.5>122.6			
5	NNK-d3	211.4>122.4	7.54	6372.563	6372.563

The analysis results refer only to the items tested

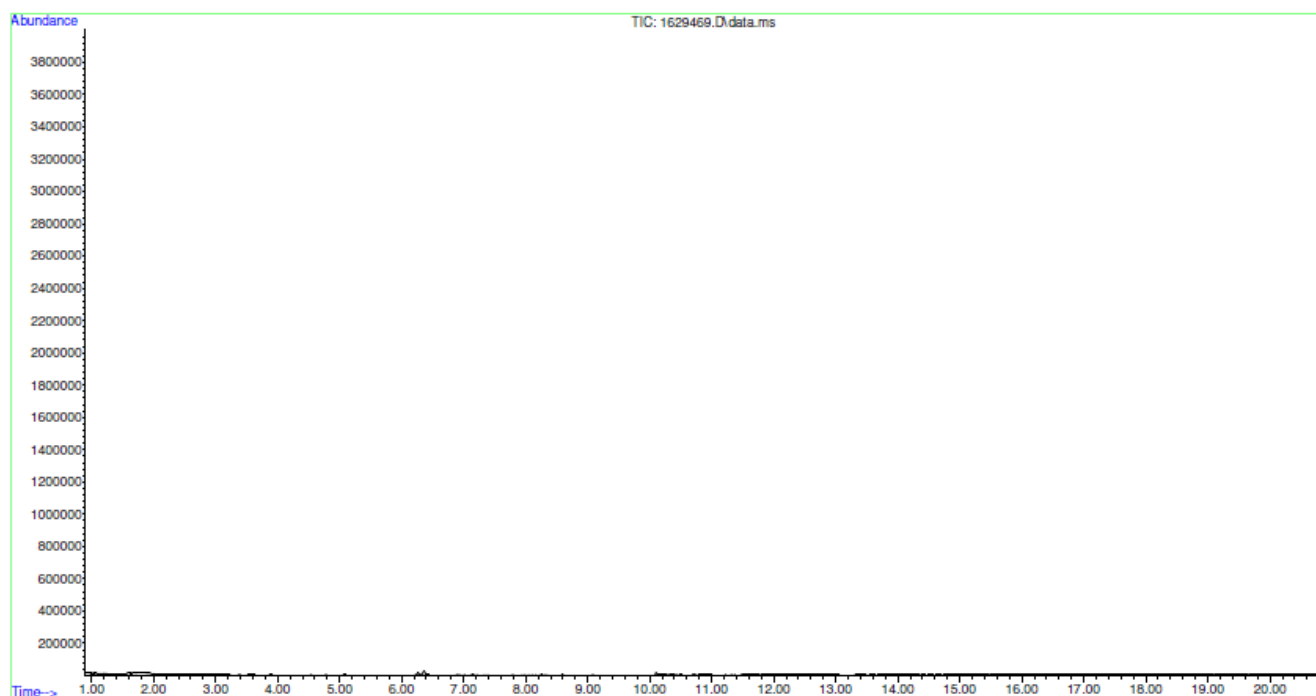
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4. Volatile organic compounds

File :D:\MassHunter\GCMS\1\data\ecigarette vocs 2016 10 27c\162946  
... 9.D  
Operator :  
Instrument : 5977A  
Acquired : 29 Oct 2016 03:23 using AcqMethod ecigarvocs.M  
Sample Name: 1629469  
Misc Info :



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## APPENDIX C

### ANALYTICAL METHODS DESCRIPTION

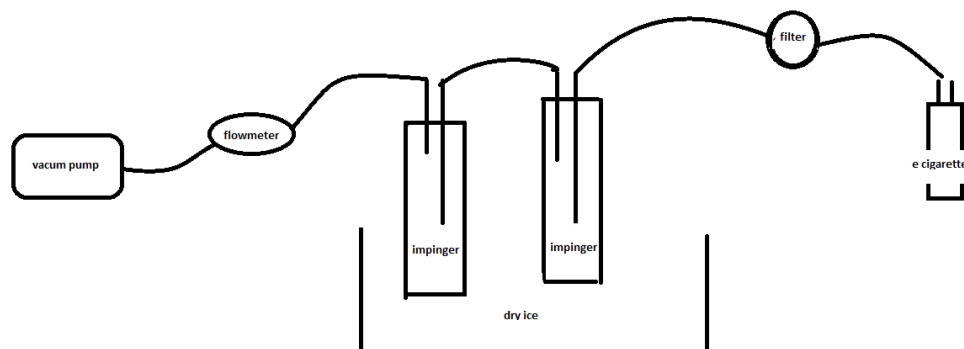
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**ANALYSIS OF ELECTRONIC CIGARETTE EMISSIONS**

**1. Vapor sampling**

For the testing of the emissions of undesirable substances from electronic cigarette devices, vaporization tests are done by the use of reference liquid B (&5.2.4, AFNOR XP D90-300-3) according to the parameters which are set in paragraph 5.4.7 of AFNOR XP D90-300-3 (July 2016).

The collection of vapor is done by filters of 37 mm diameter and traps under cooling and specifically three series of experiments were done using the following device.



**1st vaporization:** The steam is collected on the filter which is followed by the traps that contain methanol and are cooled by dry ice.

- The filter is extracted by methanol and is divided in two parts. a) on the first part, nicotine and diethylene glycol are determined by gas chromatography and flame ionization detector. b) on the second part, nitrosamines NNN και NNK are determined by liquid chromatography and mass spectrometer.
- On methanol which is collected on the traps, Toluene, Benzene, Isoprene and 1,3- Butadiene are detected by gas chromatography and mass spectrometer.

**2nd vaporization:** The vapor is collected on filter and traps that contain acetonitrile and are cooled by dry ice. The filter is extracted by the acetonitrile which is in the traps followed by derivatization of the eluate by o-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine hydrochloride (PFBHA) and analysis by gas chromatography and mass spectrometer.

**3rd vaporization:** The vapor is collected on filter which is followed by traps that contain water and are cooled. The filter is extracted by the water which is in the traps and the addition of nitric acid and analysis of the eluate for the determination of metals by atomic absorption spectroscopy is followed.

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**2. Description of analytical methods**

**Determination of Nicotine- Diethylene glycol**

Instrumentation

- Gas Chromatograph (GC) Hewlett Packard 5890
- Capillary column HP-INNOWAX with dimensions: length 30m x diameter 0.32mm x film thickness 0.25μ
- Injector split/splitless
- Detector FID
- Carrier gas helium

Experimental procedure

The filter is extracted by methanol using ultrasounds, followed by filtration of the extract. Using an appropriate aliquot of the extract, the internal standard 1-octanol is added. Then, analysis by GC/FID is followed and quantification of the compounds is done by the use of calibration curve, which is constructed by the analysis of four standards.

**Determination of carbonyl compounds, diacetyl & acetyl propionyl.**

Instrumentation

- Gas Chromatograph, Agilent 7890B
- Capillary column BPX5(SGE) with dimensions: length 30m x diameter 0,25mm x film thickness 0,25μm
- Detector 5977A MSD.
- Injector split/splitless
- Autosampler Agilent G4513A
- Carrier gas helium, chromatography purity

Experimental procedure

The method is based on the article *Analysis of selected carbonyl compounds in e-aerosols and e-liquids using pentafluorobenzyl hydroxylamine derivatization and gas chromatography-mass spectrometry, CORESTA Meeting, Smoke Science/Product Technology, 2015*, where carbonyl compounds are collected passing through the filter into traps with acetonitrile under cooling by dry ice. The filter is extracted by the acetonitrile which is in the traps. In an aliquot of the extract, internal standard of acetone-d6 is added, then diluted by water and derivatized by a water solution of o-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine hydrochloride (PFBHA) in ambient temperature for 24 hours. The PFBHA derivatives are extracted by hexane and analyzed by gas chromatography and mass spectrometer (GC/MS) on selected ion monitoring (SIM) mode. The quantification is done by the use of calibration curve which is constructed by the analysis of four standards.

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**Determination of nitrosamines**

Instrumentation

- High Pressure Liquid Chromatograph, HP 1100
- Liquid Chromatography Column ZORBAX SB-C3 Narrow-BORE 2,1x150mm 5-Micron
- Mass Spectrometer Waters Micromass Quattro.
- Nitrogen generator Peak NM series II

Experimental procedure

The method is based on the method of British American Tobacco Group Research & Development Method - Determination of tobacco-specific nitrosamines in mainstream smoke where the filter is extracted by methanol, subsequently in an aliquot of the above internal standard NNK-d<sub>3</sub> is added and analysis by LC/MS/MS is followed. The quantification is done by external calibration curve of five standards. The transitions are the following:

compound	parent ion	daughter ion
(m/z)		
NNK	208	122
NNN	178	148
NNK-d <sub>3</sub>	211	122

**Determination of volatile organic compounds**

Instrumentation

- Gas Chromatograph, Agilent 7890B
- Capillary Column BPX5(SGE) with dimensions: length 30m x diameter 0,25mm x film thickness 0,25µm
- Detector 5977A MSD.
- Injector split/splitless
- Headspace sampler, Agilent Technologies G1888
- Carrier gas helium, chromatography purity

Experimental procedure

The method is based on British American Tobacco Group Research & Development Method - Determination of selected volatiles in mainstream smoke where volatile organic compounds are collected on two traps which contain methanol under cooling by dry ice. In a methanol aliquot internal standard toluene -d<sub>8</sub> is added and analysis by gas chromatography and mass spectrometer by static headspace technique on sim mode is followed. The quantification is done by external calibration curve of four standards and based on the main ion of each compound.

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Component	Target (m/z)	Qualifiers (m/z)
1,3-Butadiene	54	53 , 51
Isoprene	67	68 , 53
Benzene	78	77 , 51
D <sub>8</sub> -Toluene	98	100
Toluene	91	92 , 65

**Determination of metals**

**A) Instrumentation**

- Atomic absorption spectrometer VARIAN AA240Z with graphite furnace (GTA120) equipped with Zeeman background correction system, autosampler (PSD 120) as well as the necessary hollow cathode lamps

**Experimental procedure**

By the method of atomic absorption spectrometry with electrothermal atomization in graphite furnace the following metals are determined:

- Cadmium
- Chromium
- Copper
- Lead
- Nickel
- Tin

**B) Instrumentation**

- Atomic absorption spectrometer VARIAN AA280FS
- Vapor generating apparatus, VARIAN VGA-77

**Experimental procedure**

Arsenic is determined in the eluate of the glass wool by the use of atomic absorption after its conversion to hydride, using sodium borohydride as reducing agent.

Mercury is determined by the use of atomic absorption after its conversion to hydride, using tin chloride as reducing agent by the technique of cold vapor.