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BÁLINT

ANALITIKA Kft.

Laboratórium

BÁLINT ANALITIKA Kft. Laboratory 20-527/6-10

Air-Filter Kft.

Analysis of workplace air

Customer: **Air-Filter Kft.**
1039 Budapest Czetz János u. 88-90

Test report approved by:

Mária Bálint
Managing Director

BÁLINT ANALITIKA KFT.
Labor: 1116 Bp., Fehérvári út 144.
Tel.: 206-0732 Fax: 382-6137
Adószám: 12079999-2-43
ERSTE: 11600006-00000000-78658398

The test report includes 13 numbered pages and 2 annexes.

May, 2020

TABLE OF CONTENTS

ANNEXES

Annex 1: Laboratory test report (16 pages)
Annex 2: On-site sampling datasheets (2 pages)

Site:	Bálint Analitika Kft. 1116 Budapest, Fehérvéri út 144.
Purpose of the study:	Efficiency test of air purification equipment type UVE 110 KUC and UVE 220 KUC developed by Air-Filter Kft.
Date of analysis:	13-14. May, 2020
Customer:	Air-Filter Kft. 1039 Budapest Czetz János u. 88-90.
The sampling performed by:	Balázs Kállay, test engineer
Analytical measurement of samples performed by:	Bálint Analitika Kft. 1116 Budapest, Fehérvári út 144.
Date of issue:	26 May, 2020

Test report prepared by:

.....
Balázs Kállay
test engineer
project leader

Test report approved by:

.....
Máriusz Merka
Head of Department

1. INTRODUCTION

From Bálint Analitika Kft. Air-Filter Kft. ordered the efficiency test of air purification equipment type UVE 110 KUC and UVE 220 KUC developed by Air-Filter Kft.
The test was performed on 13-14 May, 2020.

The present test report is based on the technology and operational data provided for us and measurement results. The measurement results are applied to the tested samples only and at the operation conditions provided by the customer. If the information provided by the customer may affect any of the test results, the responsibility lies with the customer.

2. DESCRIPTION OF THE EQUIPMENT TESTED

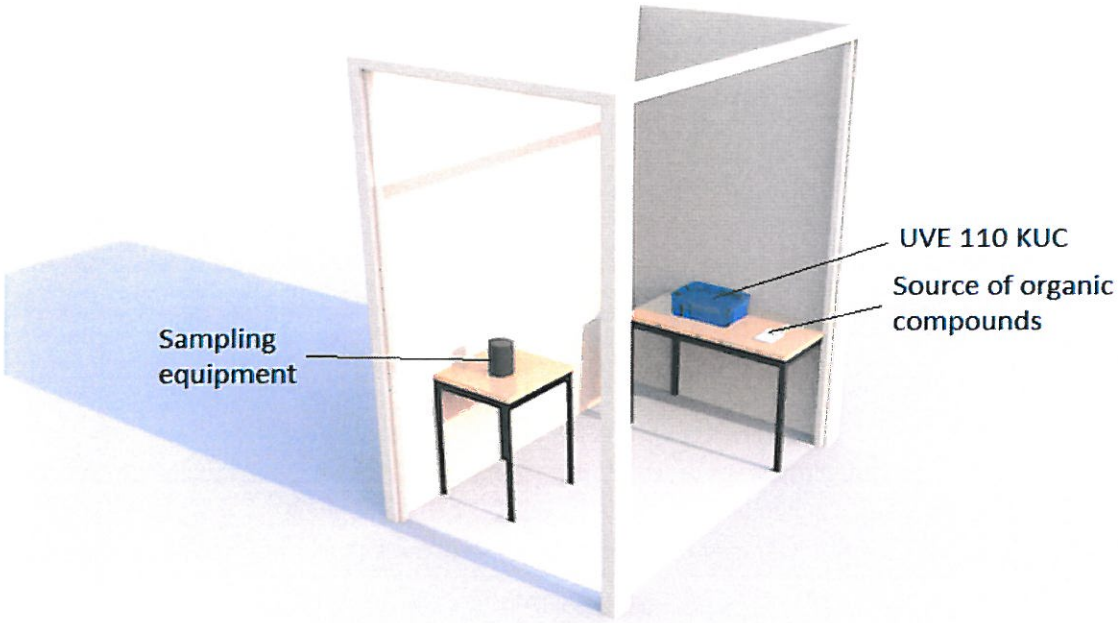
Name of equipment	Contaminants tested
UVE 110 KUC	volatile organic compounds
UVE 220 KUC	volatile organic compounds

3. AIR PURIFICATION EQUIPMENT TESTED

3.1 UVE 110 KUC

3.1.1. DEMONSTRATION OF SAMPLING AREA, DESCRIPTION OF MEASUREMENT CONDITIONS

The study site was a room of 3.00 m long, 2.00 m wide and 3.70 m high.
The air purification equipment, the organic matter source and the sampling unit were placed as shown in the figure below.



The sampling was performed in two different operating conditions:

- Operating condition I.: The organic mixture was placed in an evaporating vessel. After about 2 hours the sampling unit was started, with which the air space of the room was sampled for approx. 2 hours. The air purification equipment was turned off during the entire process, the windows were closed, the door was opened only for the duration of placement of sampling unit.
- Operating condition II.: The organic mixture was placed in an evaporating vessel. After about 2 hours the sampling unit was started, with which the air space of the room was sampled for approx. 2 hours. The air purification equipment was turned on during the entire process, the windows were closed, the door was opened only for the duration of placement of sampling unit.

For the study we used a mixture of organic matter prepared by us, which the composition is: 100µl ethyl acetate and 100µl nitro thinner (special gasoline 80/110 (926-605-8), xylene isomer mixture (215-535-7), acetone (200-662-2).

3.1.2. CHARACTERISTICS OF SAMPLING AND MEASUREMENT RESULTS

Ambient air status indicators during measurements:

Temperature [°C]: 19,6
Humidity [%]: 40,2
Atmospheric pressure [mbar]: 1009

Status indicators of workplace microclimate during measurements:

Temperature [°C]: 21,0
Humidity [%]: 33,5
Atmospheric pressure [mbar]: 1009

Specific parameters of sampling and the measurement results:

Sample ID:	T2*	N2**
Laboratory code of sample:	20-527/6	20-527/7
Date of sampling:	13.05.2020.	14.05.2020.
Date of test completion:	26.05.2020.	
Start of sampling [hr:min:sec]:	13:21:00	11:08:00
End of sampling [hr:min:sec]:	15:35:00	13:03:00
Duration of sampling [min]:	134	115
SKC pump start of air transport [l/min]	1,0020	0,5031
SKC pump end of air transport [l/min]	0,9978	0,4998
Air transport drift [%]:	-0,4	-0,7
Temperature in the calibrator [°C]:	21,0	21,0
Atmospheric pressure [mbar]:	1009	1009
Sampling volumetric flow [l/perc]:	0,9999	0,5015
Standard volume of sample [m^3]:	0,1330	0,0572

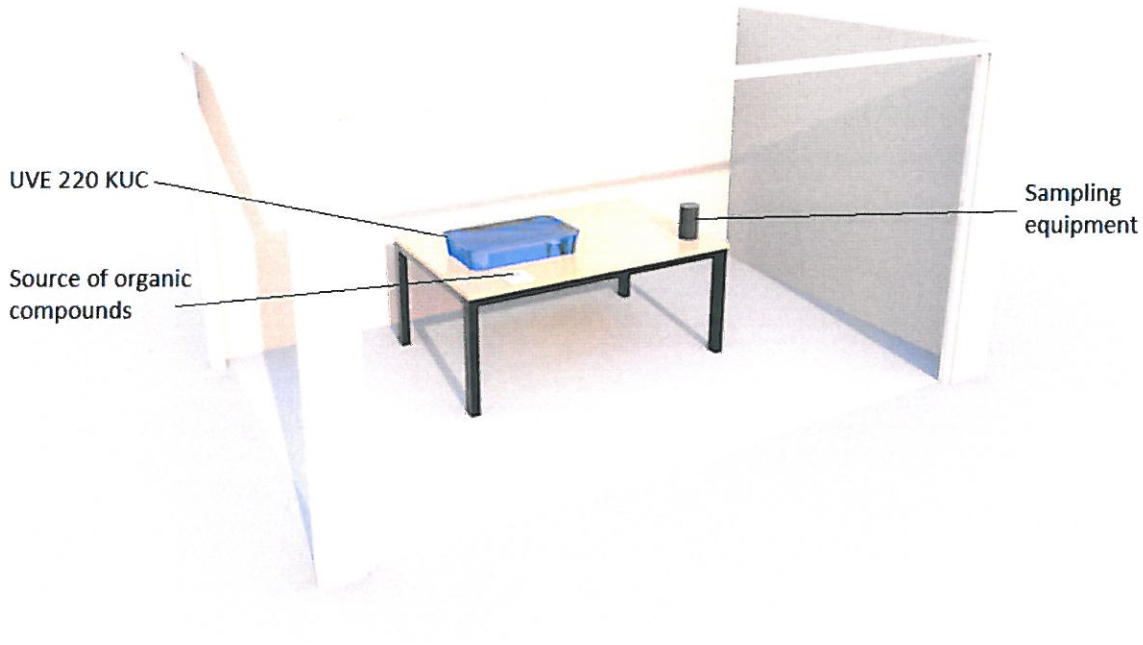
*: With the operation of air purification equipment
**: Without the operation of air purification equipment

Contaminant	Measured value [mg/m^3]	
	T2	**N2**
toluene	**0,011**	**0,021**
ethylbenzene	**0,083**	**0,136**
xylenes	**0,411**	**0,682**
i-propyl alcohol	**0,017**	**0,048**
ethyl alcohol	**0,020**	**0,078**
acetone	**0,588**	**0,75**
ethyl acetate	**0,364**	**2,044**
n-butyl acetate	**0,038**	**0,214**
hexanes (C6)	**0,010**	**0,012**
heptanes (C7)	**0,850**	**0,954**
octanes (C8)	**0,059**	**0,074**

3.2 UVE 220 KUC

3.2.1. DEMONSTRATION OF SAMPLING AREA, DESCRIPTION OF MEASUREMENT CONDITIONS

The study site was a room of 6.00 m long, 3.80 m wide and 3.00 m high.
The air purification equipment, the organic matter source and the sampling unit were placed as shown in the figure below.



The sampling was performed in two different operating conditions:

- Operating condition I.: The organic mixture was placed in an evaporating vessel. After about 2 hours the sampling unit was started, with which the air space of the room was sampled for approx. 2 hours. The air purification equipment was turned off during the entire process, the windows were closed, the door was opened only for the duration of placement of sampling unit.
- Operating condition II.: The organic mixture was placed in an evaporating vessel. After about 2 hours the sampling unit was started, with which the air space of the room was sampled for approx. 2 hours. The air purification equipment was turned on during the entire process, the windows were closed, the door was opened only for the duration of placement of sampling unit.

For the study we used a mixture of organic matter prepared by us, which the composition is: 300µl ethyl acetate and 300µl nitro thinner (special gasoline 80/110 (926-605-8), xylene isomer mixture (215-535-7), acetone (200-662-2).

3.2.2. CHARACTERISTICS OF SAMPLING AND MEASUREMENT RESULTS

Ambient air status indicators during measurements:

Temperature [°C]: 19,6
Humidity [%]: 40,2
Atmospheric pressure [mbar]: 1009

Status indicators of workplace microclimate during measurements:

Temperature [°C]: 21,0
Humidity [%]: 33,5
Atmospheric pressure [mbar]: 1009

Specific parameters of sampling and the measurement results:

Sample ID:	TT2*	NN2**
Laboratory code of sample:	20-527/8	20-527/9
Date of sampling:	13.05.2020.	14.05.2020.
Date of test completion:	26.05.2020.	
Start of sampling [hr:min:sec]:	9:23:00	8:11:00
End of sampling [hr:min:sec]:	11:11:00	9:56:00
Duration of sampling [min]:	108	105
SKC pump start of air transport [l/min]	1,1930	0,9941
SKC pump end of air transport [l/min]	1,1890	1,0180
Air transport drift [%]:	-0,3	2,4
Temperature in the calibrator [°C]:	21,0	21,0
Atmospheric pressure [mbar]:	1009	1009
Sampling volumetric flow [l/perc]:	1,1910	1,0061
Standard volume of sample [m^3]:	0,1277	0,1049

*: With the operation of air purification equipment
**: Without the operation of air purification equipment

Contaminant	Measured value [mg/m^3]	
	TT2	**NN2**
toluene	**0,055**	**0,051**
ethylbenzene	**0,043**	**0,065**
xylenes	**0,196**	**0,332**
i-propyl alcohol	**0,060**	**0,088**
ethyl alcohol	**0,029**	**0,028**
acetone	**0,548**	**0,551**
ethyl acetate	**0,373**	**1,049**
n-butyl acetate	**0,018**	**0,110**
hexanes (C6)	**0,008**	**0,010**
heptanes (C7)	**0,316**	**0,422**
octanes (C8)	**0,023**	**0,033**

4. APPLIED METHODS AND EQUIPMENT

General standards

MSZ EN 482:2012+A1:2016[2]	Workplace exposure. General requirements for the performance of procedures for the measurement of chemical agents.
MSZ ISO 689:1999 (standard withdrawn)	Workplace exposure. Measurement of exposure to inhalation chemical agents. Measurement strategies for the comparison with occupational exposure limit values.

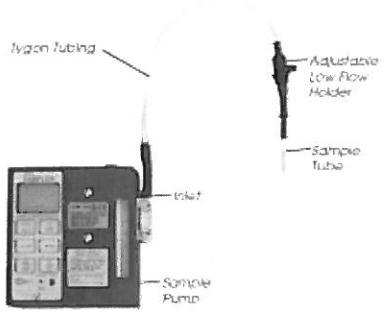
Determination of ambient air and workplace microclimate status indicators

MSZ 21452-1:1975 Section 2. and 4. Measurement uncertainty: ±5%	Measurement of moisture content
MSZ 21452-3:1975 Measurement uncertainty: ±5%	Temperature measurement

TESTO 608-H1 type multifunctional instrument with digital display was applied for the determination of status indicators of ambient air and the workplace microclimate (temperature, relative humidity, air speed, atmospheric pressure), which measures also the temperature and relative humidity at the given point of measurement. The device automatically calculates the absolute humidity from the data measured. A Feingerateben Fischer MTG 104 type spring-loaded certified air pressure gauge was used to measure the atmospheric pressure.

Determination of organic compounds and formaldehyde:

ISO 16200-1:2001 Measurement uncertainty: ±5%	Determination of volatile and semivolatile organic compounds



The sample for the determination of organic compounds was taken on an activated carbon filled adsorption tube (SKC 226-01) in batch process. The special feature of the SKC AIRCHECK type pump used is that it is able to maintain the pre-set sampling volumetric flow with high accuracy regardless of the suction side resistance. Before and after each sampling the air transport of the pumps was calibrated with a certified SKC DRYCAL DC-Lite type calibrator.

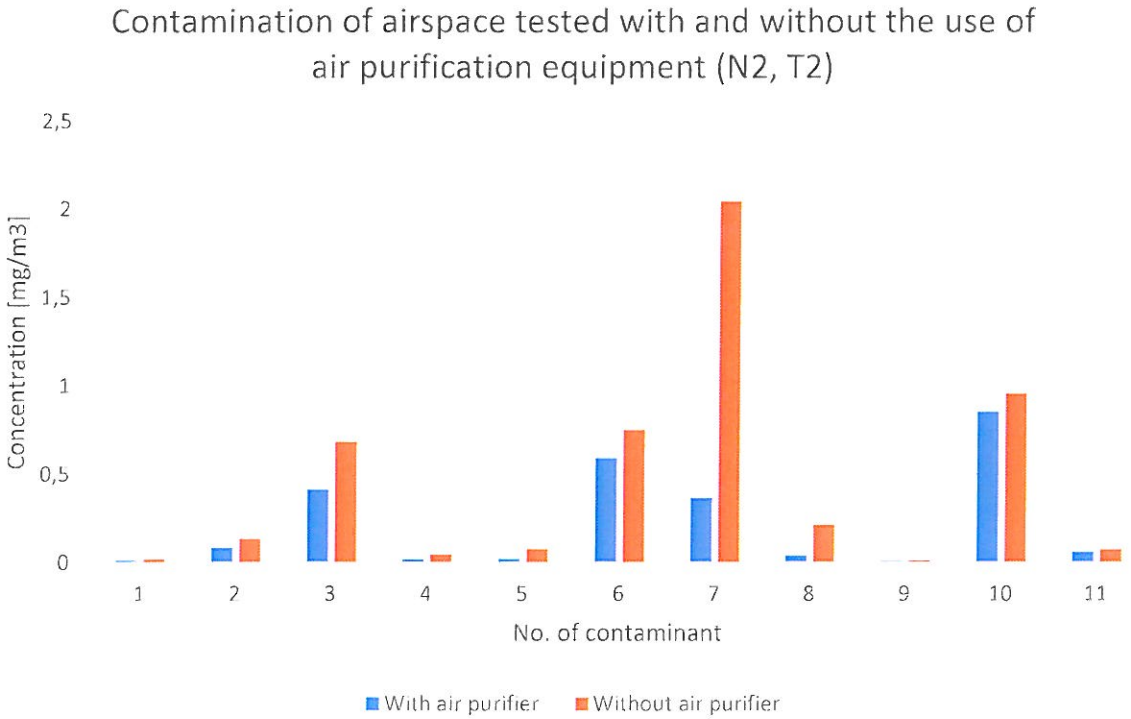
Evaluation of measurement results

The evaluation of measurement results was according to the regulation of 25/2000. (IX. 30.) EüM-SZCSM by Microsoft Excel 2002 software.

5. EVALUATION OF MEASUREMENT RESULTS FOR UVE 110 KUC

The air contamination evolvement in the test without the operation of the air purification equipment (N2) and during the operation of the air purification equipment (T2) between 2 and 4 hours after the placement of the organic matter mixture.

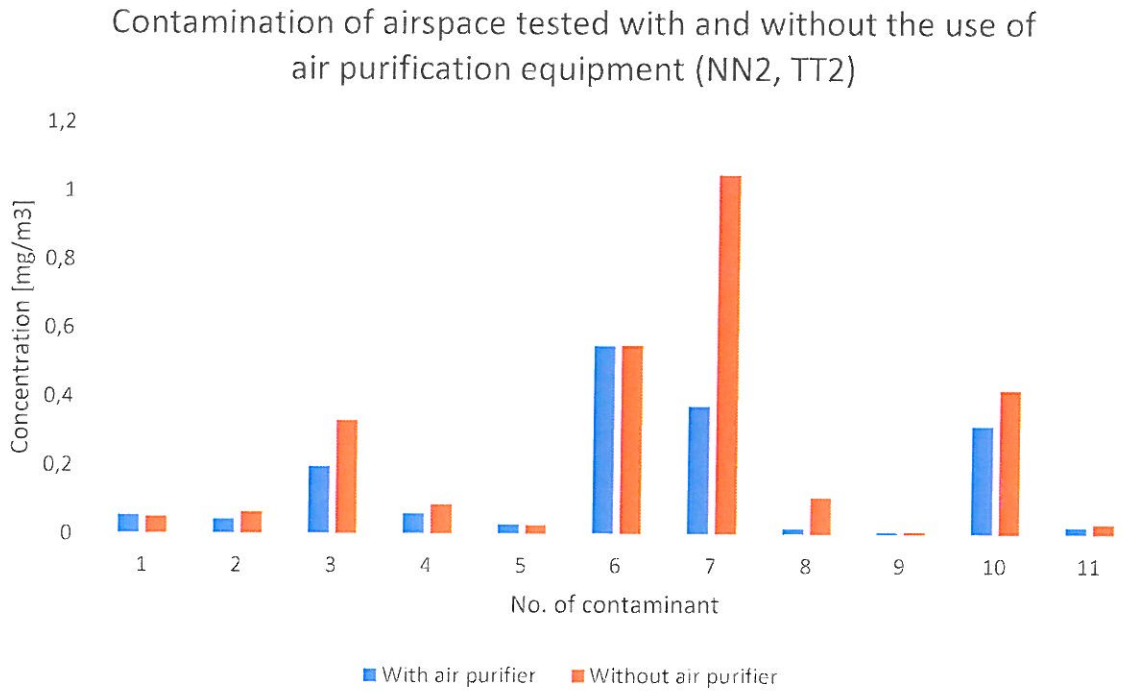
No. of contaminant	Name of contaminant	Measured value [mg/m^3]		Concentration change (%)
		N2	T2	
1	toluene	**0,021**	**0,011**	**-47,62**
2	ethylbenzene	**0,136**	**0,083**	**-38,97**
3	xylenes	**0,682**	**0,411**	**-39,74**
4	i-propyl alcohol	**0,048**	**0,017**	**-64,58**
5	ethyl alcohol	**0,078**	**0,020**	**-74,36**
6	acetone	**0,75**	**0,588**	**-21,60**
7	ethyl acetate	**2,044**	**0,364**	**-82,19**
8	n-butyl acetate	**0,214**	**0,038**	**-82,24**
9	hexanes (C6)	**0,012**	**0,010**	**-16,67**
10	heptanes (C7)	**0,954**	**0,850**	**-10,90**
11	octanes (C8)	**0,074**	**0,059**	**-20,27**



6. EVALUATION OF MEASUREMENT RESULTS FOR UVE 220 KUC

The air contamination evolvement in the test without the operation of the air purification equipment (NN2) and during the operation of the air purification equipment (TT2) between 2 and 4 hours after the placement of the organic matter mixture.

No. of contaminant	Name of contaminant	Measured value [mg/m^3]		Concentration change (%)
		NN2	TT2	
1	toluene	**0,051**	**0,055**	-
2	ethylbenzene	**0,065**	**0,043**	**-33,85**
3	xylenes	**0,332**	**0,196**	**-40,96**
4	i-propyl alcohol	**0,088**	**0,060**	**-31,82**
5	ethyl alcohol	**0,028**	**0,029**	-
6	acetone	**0,551**	**0,548**	**-0,54**
7	ethyl acetate	**1,049**	**0,373**	**-64,44**
8	n-butyl acetate	**0,110**	**0,018**	**-83,64**
9	hexanes (C6)	**0,010**	**0,008**	**-20,00**
10	heptanes (C7)	**0,422**	**0,316**	**-25,12**
11	octanes (C8)	**0,033**	**0,023**	**-30,30**



Budapest, 26 May, 2020

-End of test report-

Annex 1.

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Fehérvári út 144.

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BÁLINT

ANALITIKA Kft.

Laboratórium

BÁLINT ANALITIKA Kft. Laboratory 20-527/6-10

Air-Filter Kft.

Test results of workplace air samples

CUSTOMER: **Air-Filter Kft.**
1039 Budapest, Czetz János u. 88-90.

Test report approved by:

Mária Bálint
Managing Director

BÁLINT ANALITIKA KFT.
Labor: 1116 Bp., Fehérvári út 144.
Tel.: 206-0732 Fax: 382-6137
Adószám: 12079999-2-43
ERSTE: 11600006-00000000-78658398
7.

The test report includes 6 numbered pages and 10 chromatograms.

May, 2020

Test report

Air-Filter Kft.

Measurement results of workplace air samples

Customer: Air-Filter Kft.

Order No: 20-527

Laboratory code of samples: 20-527/6-10

Project leader: Rita Szukicsné Madarász

Sampling and sample delivery to the laboratory: by Bálint Analitika Kft.

Status of sampling: accredited

Date of arrival of samples to the laboratory: 15.05.2020.

Samples for requested tests:

20-527/6-10 **Analysis of volatile organic compounds in workplace air samples**

The measurement results are applied to the tested samples only.
The responsibility of sampling is borne by the sampler referred above.
If information provided by the customer may affect any of the test results, the responsibility lies with the customer.

Test method:

ISO 16200-1:2001 Measurement uncertainty: ± 10% Surrogate standard corrected value	Determination of volatile organic compounds

Test report prepared by:

Anita Sági
test engineer

Project leader:

Rita Szukicsné Madarász
Head of Department

Budapest, 2020.05.28.

Measurement results

Air-Filter Kft.

Measurement results of workplace air samples

µg/sample

Date of arrival: 15.05.2020.

Lab code	20-527/6	20-527/6	20-527/6
Sample ID / **Components**	**T2 main zone**	**T2 control zone**	**T2 main+control zone**
Start of sample preparation/ End of test	19.05./22.05.	19.05./22.05.	19.05./22.05.
toluene	1,4	nd	1,4
ethylbenzene	11,0	nd	11,0
xylenes	54,6	nd	54,6
isopropyl alcohol	2,3	nd	2,3
ethyl alcohol	2,6	nd	2,6
acetone	78,2	nd	78,2
ethyl acetate	48,4	nd	48,4
n-butyl acetate	5,1	nd	5,1
hexanes (C_6)	1,3	nd	1,3
heptanes (C_7)	113	nd	113
octanes (C_8)	7,9	nd	7,9

Date of arrival: 15.05.2020.

Lab code	20-527/7	20-527/7	20-527/7
Sample ID / **Components**	**N2 main zone**	**N2 control zone**	**N2 main+control zone**
Start of sample preparation/ End of test	19.05./22.05.	19.05./22.05.	19.05./22.05.
toluene	1,2	nd	1,2
ethylbenzene	7,8	nd	7,8
xylenes	39,1	nd	39,1
isopropyl alcohol	2,8	nd	2,8
ethyl alcohol	4,5	nd	4,5
acetone	42,9	nd	42,9
ethyl acetate	117	nd	117
n-butyl acetate	12,2	nd	12,2
hexanes (C_6)	0,7	nd	0,7
heptanes (C_7)	54,6	nd	54,6
octanes (C_8)	4,2	nd	4,2

Detection limit of method (nd): 0,1 µg/sample
For aliphatic hydrocarbons (nd): 0,5 µg/sample

Air-Filter Kft.

Measurement results of workplace air samples

µg/sample

Date of arrival: 15.05.2020.

Lab code	20-527/8	20-527/8	20-527/8
Sample ID / **Components**	**TT2 main zone**	**TT2 control zone**	**TT2 main+control zone**
Start of sample preparation/ End of test	19.05./22.05.	19.05./22.05.	19.05./22.05.
toluene	7,0	nd	7,0
ethylbenzene	5,5	nd	5,5
xylenes	25,0	nd	25,0
isopropyl alcohol	7,7	nd	7,7
ethyl alcohol	3,7	nd	3,7
acetone	70,0	nd	70,0
ethyl acetate	47,6	nd	47,6
n-butyl acetate	2,3	nd	2,3
hexanes (C_6)	1,0	nd	1,0
heptanes (C_7)	40,4	nd	40,4
octanes (C_8)	3,0	nd	3,0

Date of arrival: 15.05.2020.

Lab code	20-527/9	20-527/9	20-527/9
Sample ID / **Components**	**NN2 main zone**	**NN2 control zone**	**NN2 main+control zone**
Start of sample preparation/ End of test	19.05./22.05.	19.05./22.05.	19.05./22.05.
toluene	5,3	nd	5,3
ethylbenzene	6,8	nd	6,8
xylenes	34,8	nd	34,8
isopropyl alcohol	9,2	nd	9,2
ethyl alcohol	2,9	nd	2,9
acetone	57,8	nd	57,8
ethyl acetate	110	nd	110
n-butyl acetate	11,5	nd	11,5
hexanes (C_6)	1,0	nd	1,0
heptanes (C_7)	44,3	nd	44,3
octanes (C_8)	3,5	nd	3,5

Detection limit of method (nd): 0,1 µg/sample
For aliphatic hydrocarbons (nd): 0,5 µg/sample

Air-Filter Kft.

Measurement results of workplace air samples

µg/sample

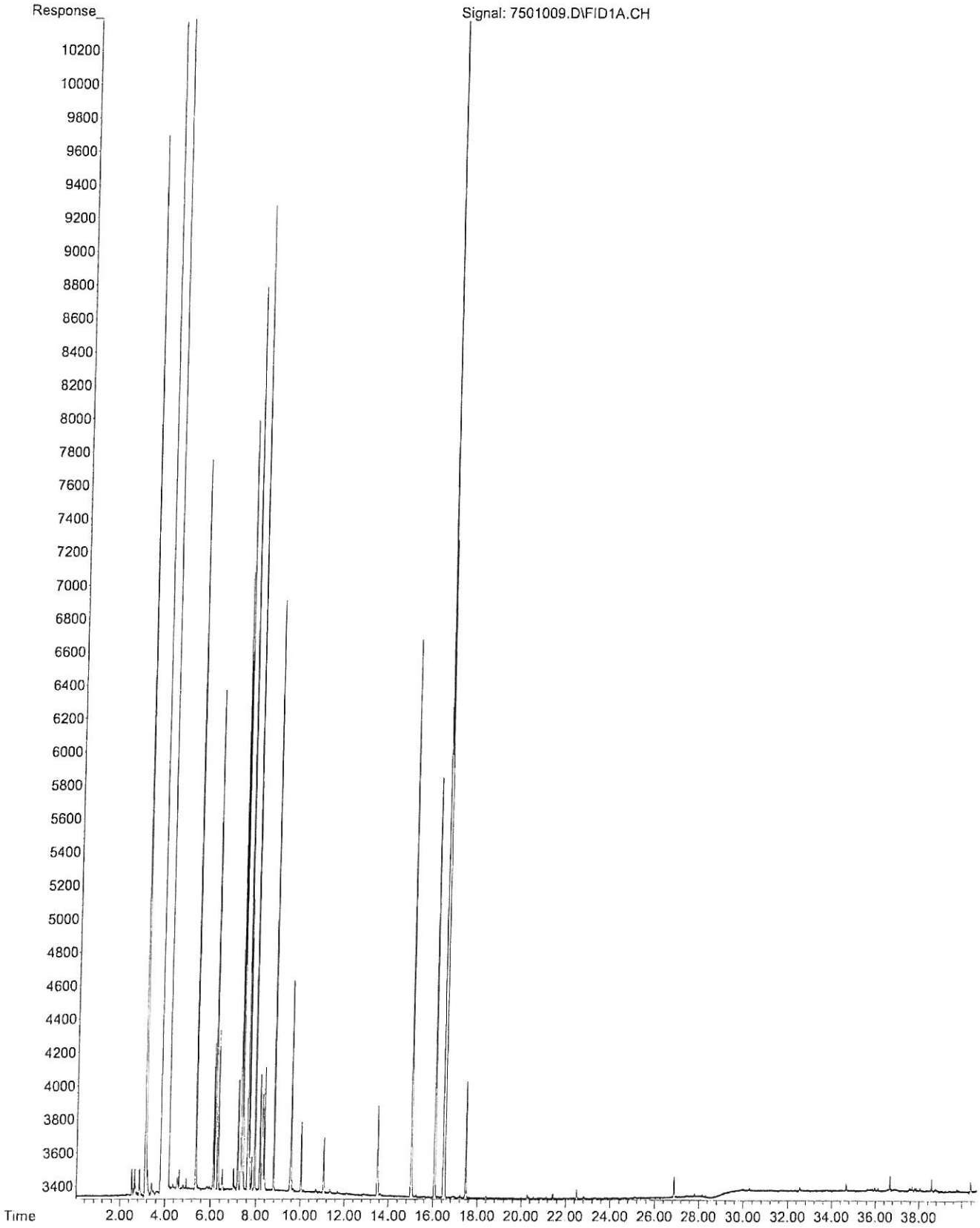
Date of arrival: 15.05.2020.

Lab code	20-527/10	20-527/10	20-527/10
Sample ID **Components**	**BLANK2 main zone**	**BLANK2 control zone**	**BLANK2 main+control zone**
Start of sample preparation/ End of test	19.05./22.05.	19.05./22.05.	19.05./22.05.
toluene	nd	nd	nd
ethylbenzene	nd	nd	nd
xylenes	nd	nd	nd
isopropyl alcohol	nd	nd	nd
ethyl alcohol	nd	nd	nd
acetone	nd	nd	nd
ethyl acetate	nd	nd	nd
n-butyl acetate	nd	nd	nd
hexanes (C_6)	nd	nd	nd
heptanes (C_7)	nd	nd	nd
octanes (C_8)	nd	nd	nd

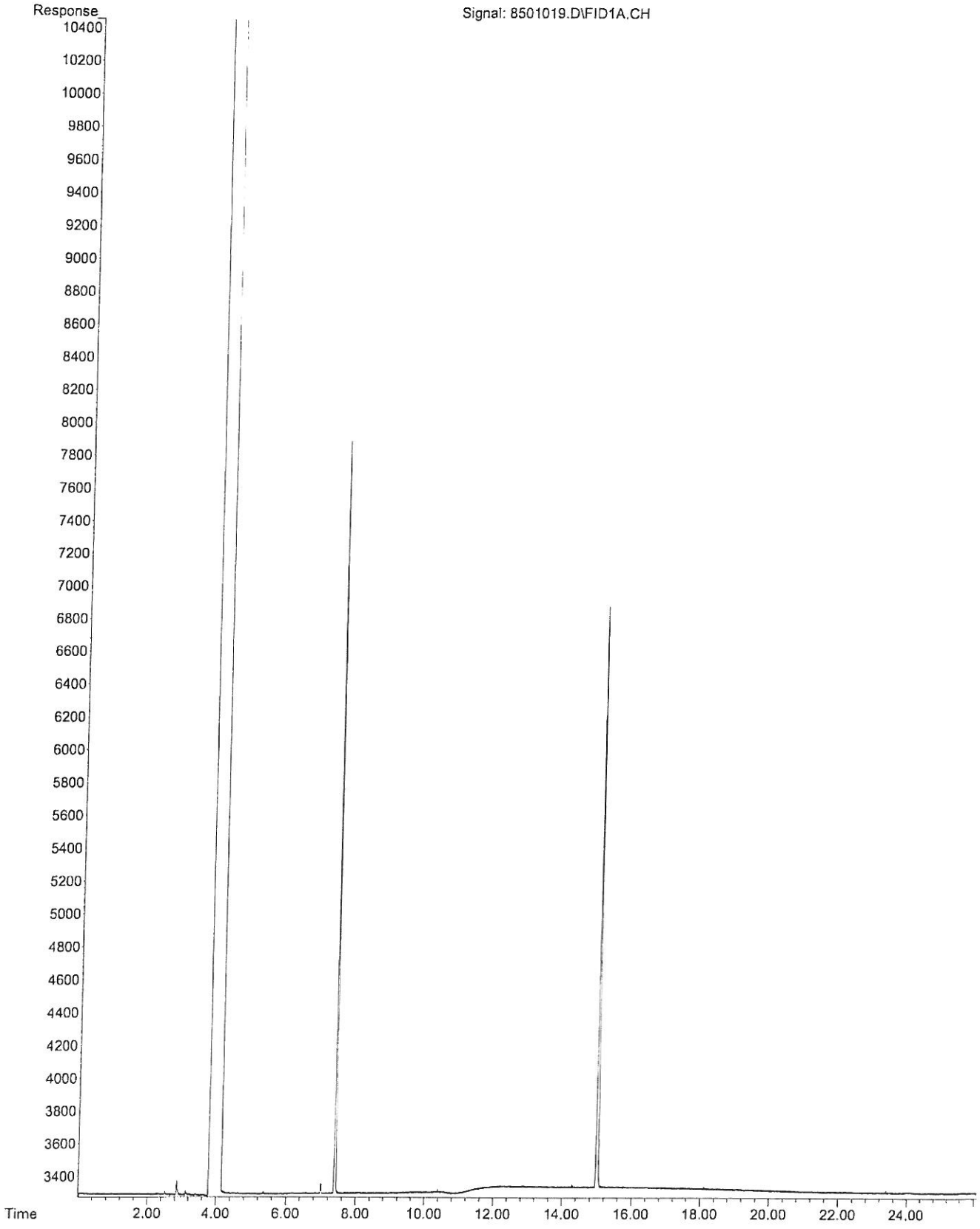
Detection limit of method (nd): 0,1 µg/sample
For aliphatic hydrocarbons (nd): 0,5 µg/sample

Chromatograms

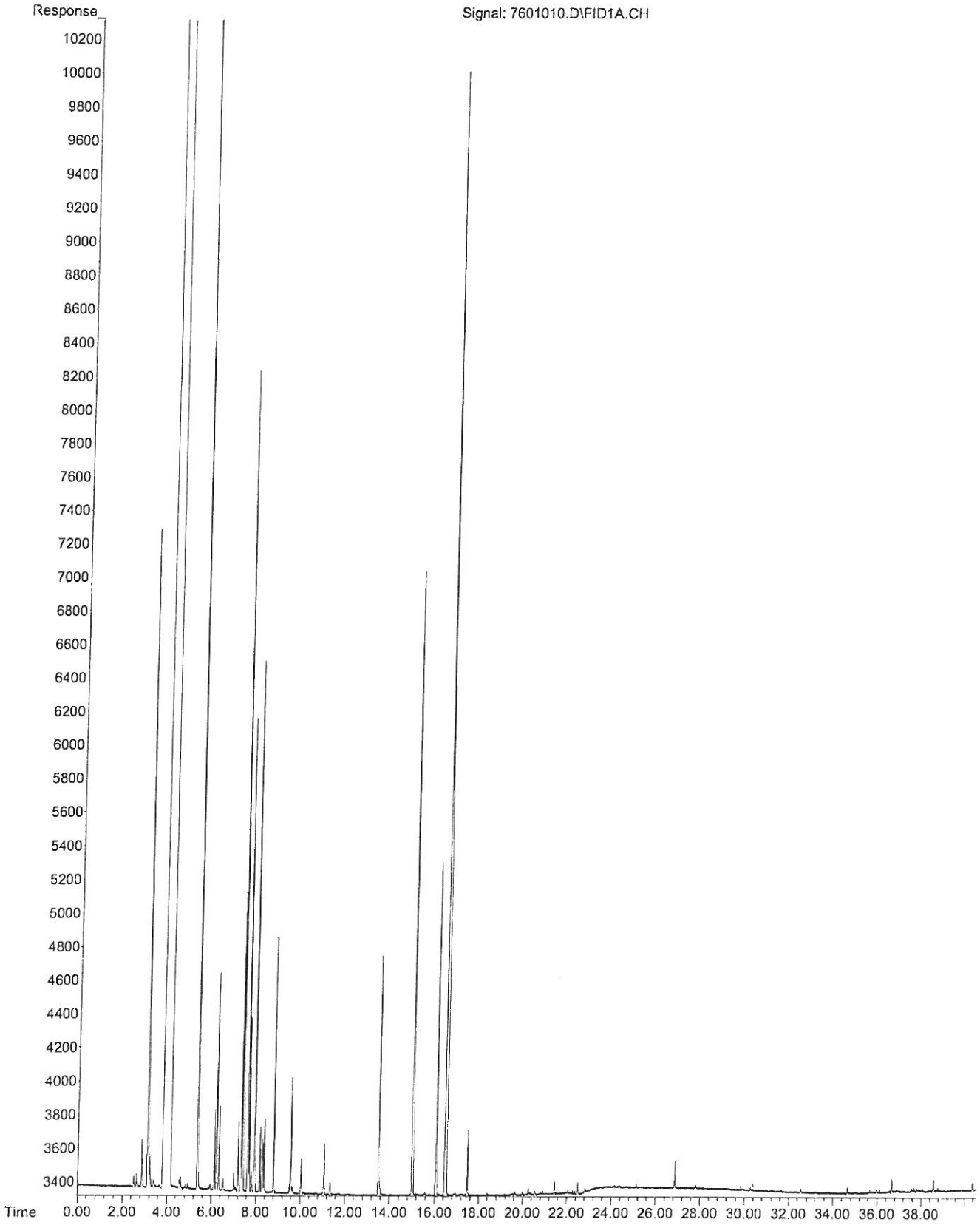
File : E:\DATA\2020\20-200513\7501009.D
Operator : Sagi
Acquired : 19 May 2020 20:53 using AcqMethod PONA-40.M
Instrument : GC19
Sample Name: T2 1ml 20-527/6 A
Misc Info : NANOCOLLTECH
Vial Number: 75



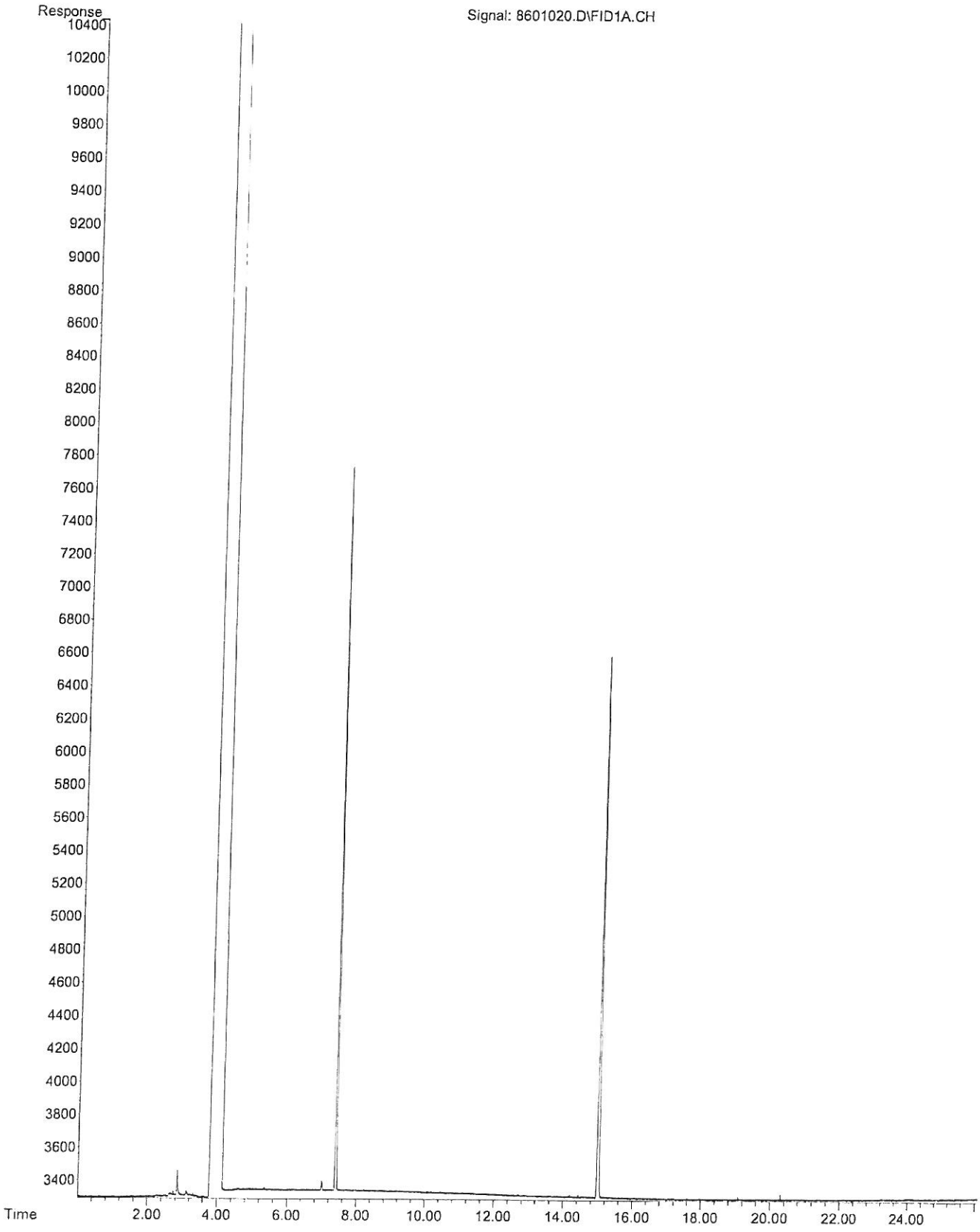
File : E:\DATA\2020\20-200513\8501019.D
Operator : Sagi
Acquired : 20 May 2020 4:20 using AcqMethod PONA-25.M
Instrument : GC19
Sample Name: T2 1ml 20-527/6 B
Misc Info : NANOCOLLTECH
Vial Number: 85



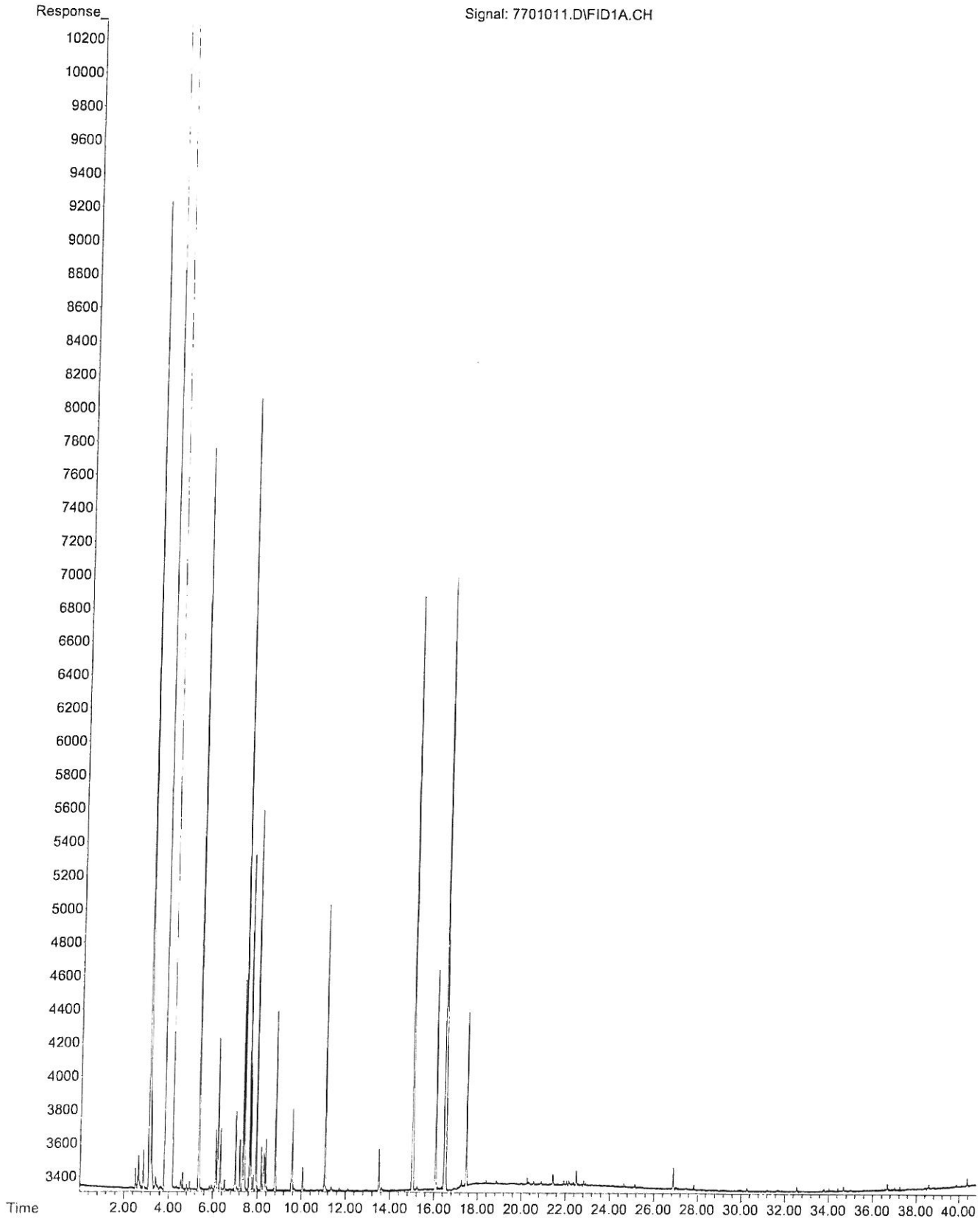
File : E:\DATA\2020\20-200513\7601010.D
Operator : Sagi
Acquired : 19 May 2020 21:50 using AcqMethod PONA-40.M
Instrument : GC19
Sample Name: N2 1ml 20-527/7 A
Misc Info : NANOCOLLTECH
Vial Number: 76



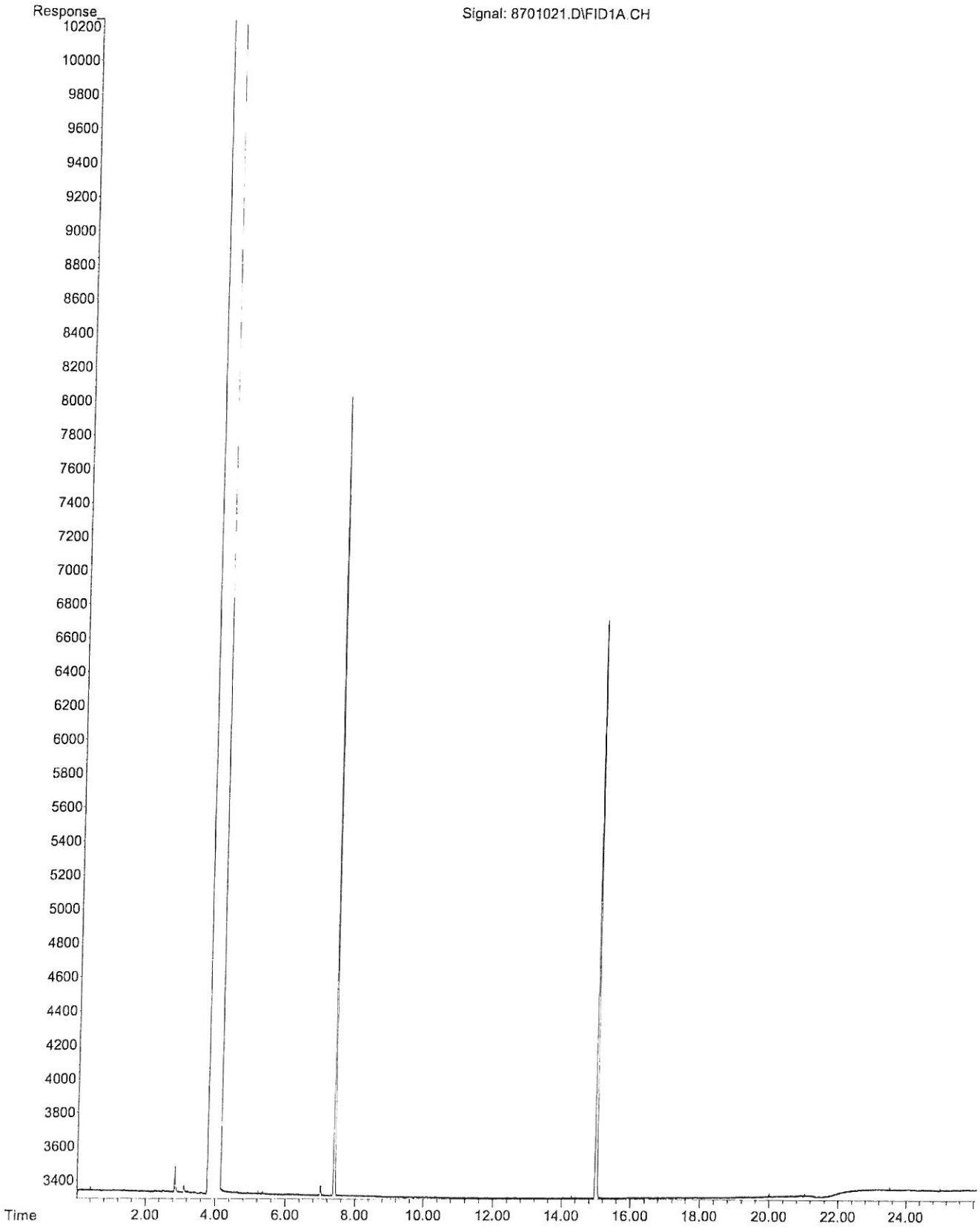
File : E:\DATA\2020\20-200513\8601020.D
Operator : Sagi
Acquired : 20 May 2020 4:52 using AcqMethod PONA-25.M
Instrument : GC19
Sample Name: N2 1ml 20-527/7 B
Misc Info : NANOCOLLTECH
Vial Number: 86



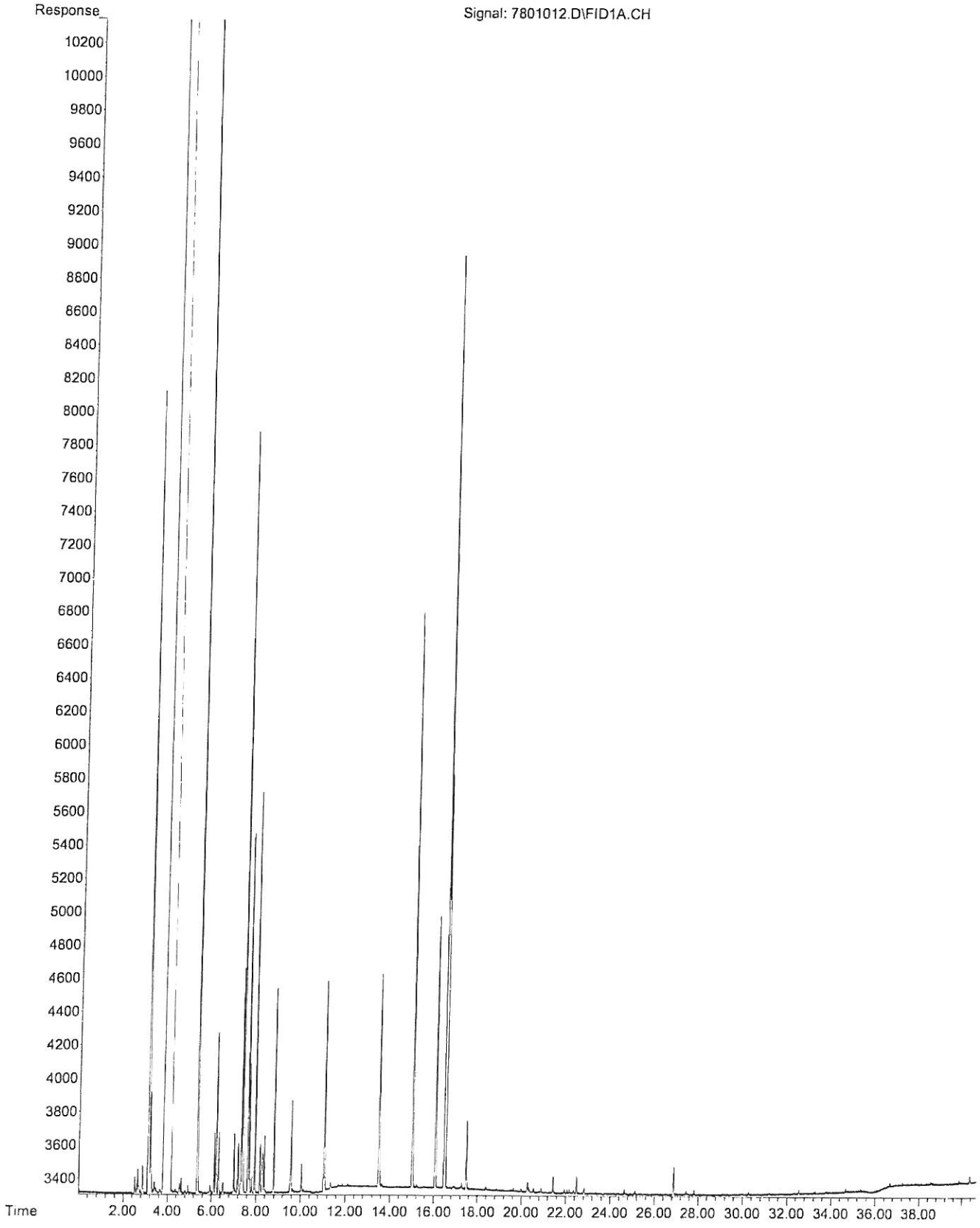
File : E:\DATA\2020\20-200513\7701011.D
Operator : Sagi
Acquired : 19 May 2020 22:46 using AcqMethod PONA-40.M
Instrument : GC19
Sample Name: TT2 1ml 20-527/8 A
Misc Info : NANOCOLLTECH
Vial Number: 77



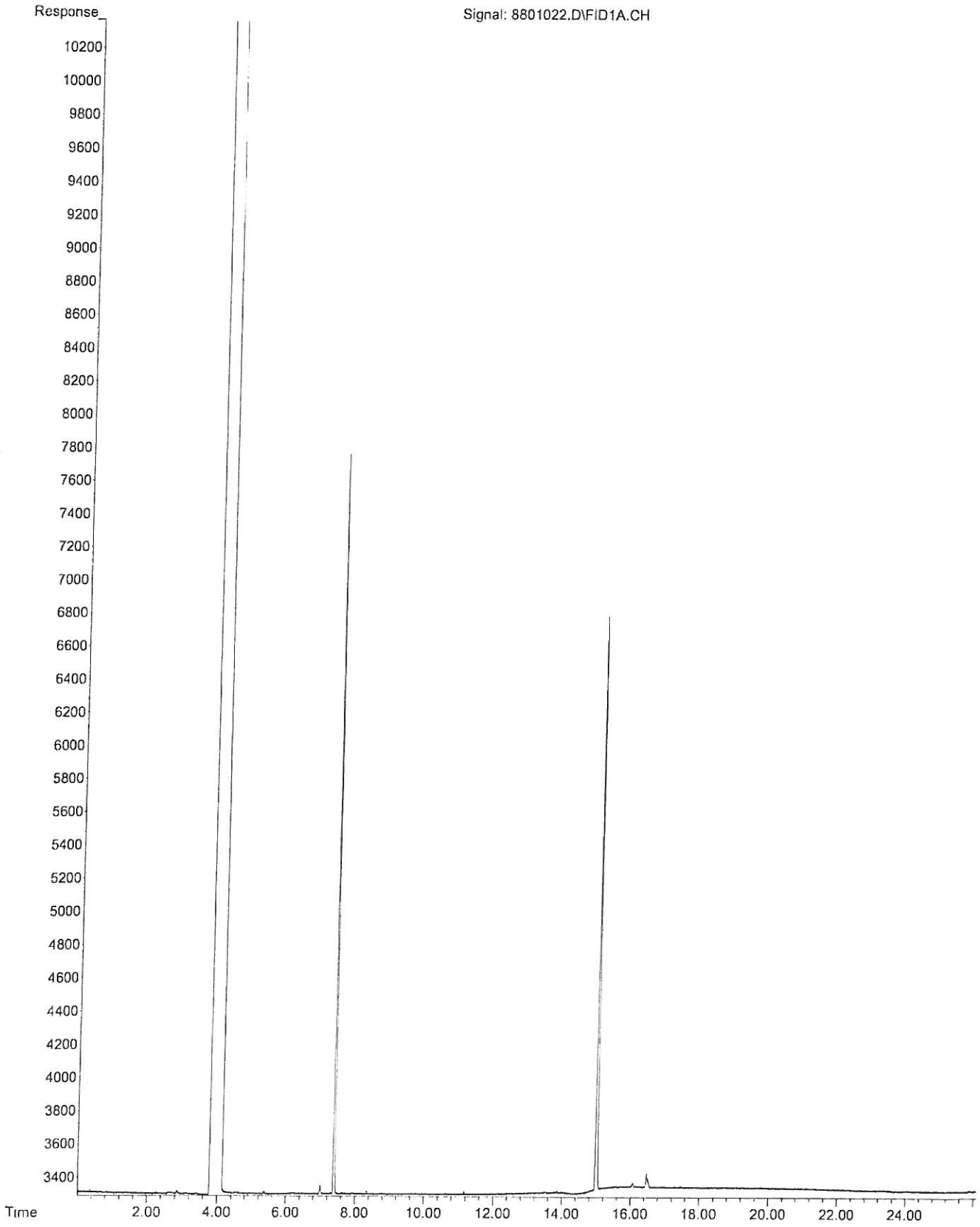
File : E:\DATA\2020\20-200513\8701021.D
Operator : Sagi
Acquired : 20 May 2020 5:25 using AcqMethod PONA-25.M
Instrument : GC19
Sample Name: TT2 1ml 20-527/8 B
Misc Info : NANOCOLLTECH
Vial Number: 87



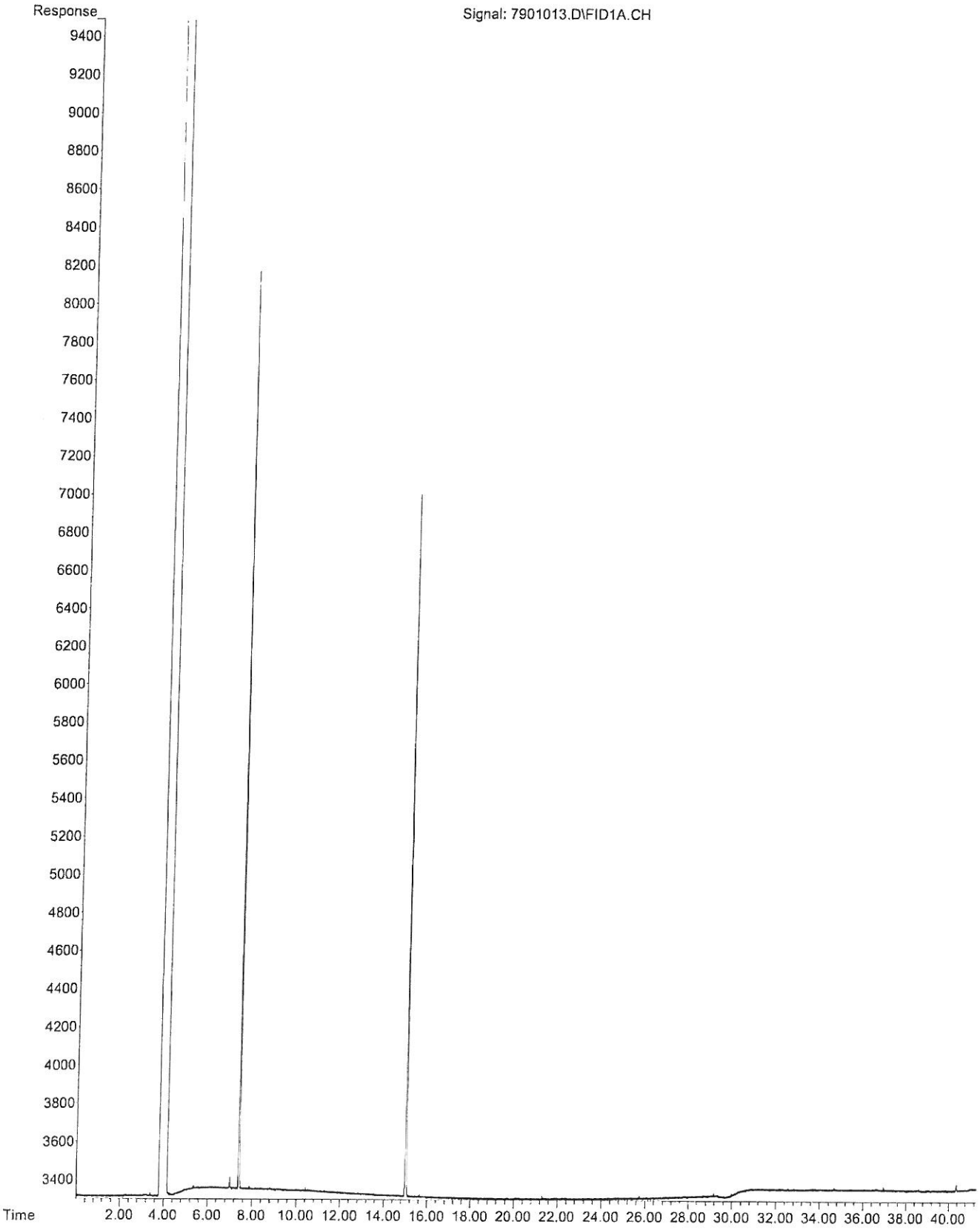
File : E:\DATA\2020\20-200513\7801012.D
Operator : Sagi
Acquired : 19 May 2020 23:43 using AcqMethod PONA-40.M
Instrument : GC19
Sample Name: NN2 1ml 20-527/9 A
Misc Info : NANOCOLLTECH
Vial Number: 78



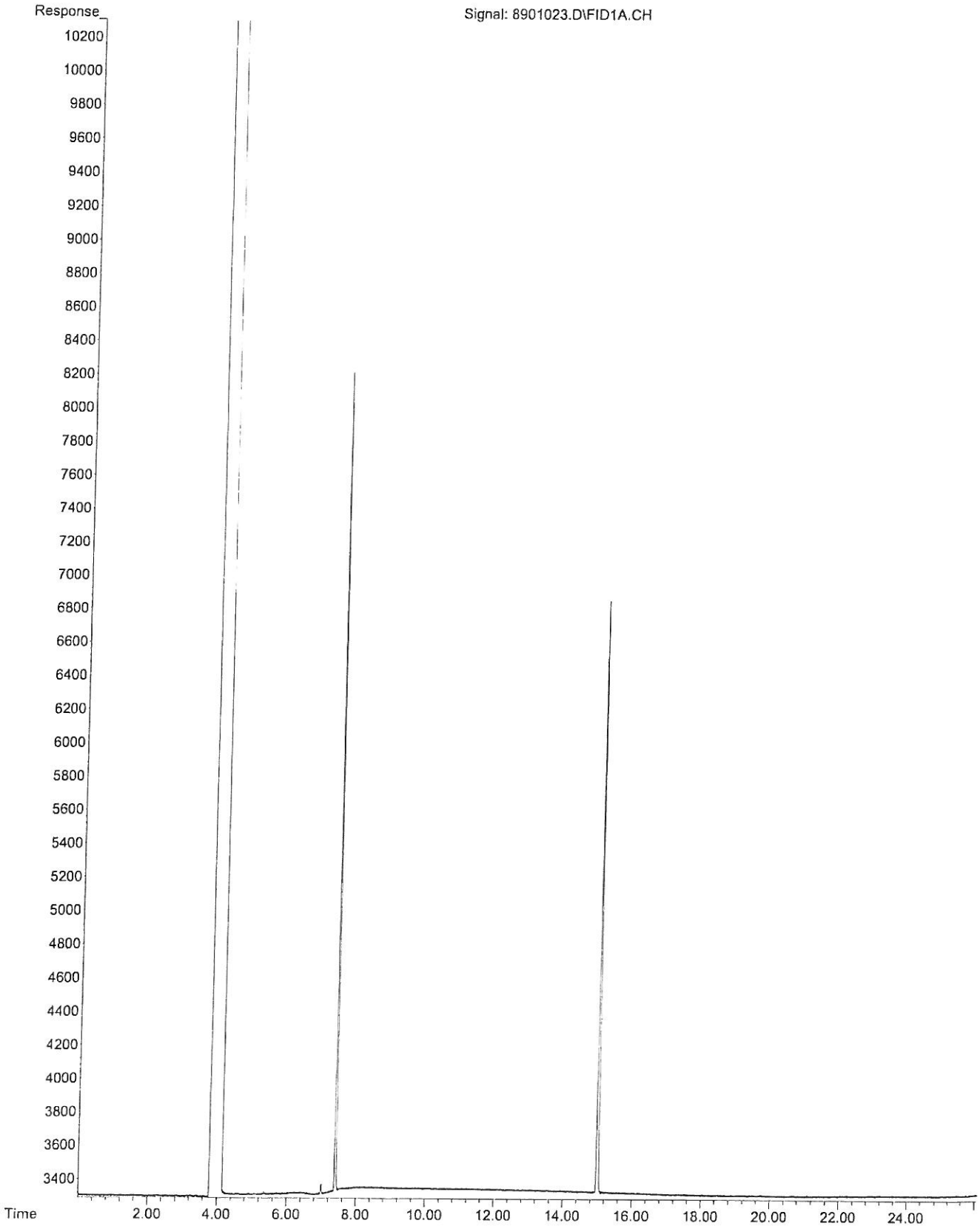
File : E:\DATA\2020\20-200513\8801022.D
Operator : Sagi
Acquired : 20 May 2020 5:57 using AcqMethod PONA-25.M
Instrument : GC19
Sample Name: NN2 1ml 20-527/9 B
Misc Info : NANOCOLLTECH
Vial Number: 88



File : E:\DATA\2020\20-200513\7901013.D
Operator : Sagi
Acquired : 20 May 2020 00:40 using AcqMethod PONA-40.M
Instrument : GC19
Sample Name: VAK2 1ml 20-527/10 A
Misc Info : NANOCOLLTECH
Vial Number: 79



File : E:\DATA\2020\20-200513\8901023.D
Operator : Sagi
Acquired : 20 May 2020 6:30 using AcqMethod PONA-25.M
Instrument : GC19
Sample Name: VAK2 1ml 20-527/10 B
Misc Info : NANOCOLLTECH
Vial Number: 89



Annex 2.

BÁLINT ANALITIKA Kft. Laboratórium		Személyi mintavételi adatlap	QM-M/13-2-3/2	A NAH által NAH-1-1666/2019 számon akkreditált vizsgálólaboratórium.
Kiadás:5	Változat:3		Oldal: 1/2	
Kiadás dátuma: 2019.02.20.	Változat dátuma: 2019.11.07.			
Készítette: Iglóváriné Molnár Mária Aláírás: Iglóvári		Jóváhagyta: Bálint Mária Aláírás: Bálint		

Dátum:	2020.05.13-14.
Telephely:	
Mintavételt végezte:	Kollár Balázs
Akkreditált:	☒ mintavétel; ☐ helyszíni vizsgálat

A VIZSGÁLT DOLGOZÓ ADATAI

Dolgozó neve:	–
Dolgozó beosztása:	–
Dolgozó munkaideje:	–
Dolgozó feladata:	–
Dohányzik-e ?	–
A dolgozó kiválasztásának szempontja:	–
A dolgozó által használt védőfelszerelések:	–

A DOLGOZÓ TEVÉKENYSÉGE

Munkaidő-szakaszok	Tevékenység	Időtartam, [perc]

Megjegyzés:

SZEMÉLYI MINTAVÉTEL

Minta jele	Mintavétel		Mintavételi térfogatáram [l/perc]		Légszállítás drift [%]	Időtartam [perc]	Pumpa száma
	kezdete	vége	induláskor	befejezéskor			
05.13 I_2	13:21	15:35	1,002	0,997	-0,4	134	P14
05.14 N_2	11:02	13:03	0,5031	0,4993	-0,7	115	K13
05.13 TT_2	9:23	11.11	1,1930	1,1890	-0,3	100	P13
05.14 NN_2	7:18	9:56	0,9941	1,0180	2,4	105	P14

Megjegyzés/Zavaró körülmények:

LEHETSÉGES EXPOZICIÓ AZONOSÍTÁS - TECHNOLÓGIAI FOLYAMATOK

Technológia megnevezése:	
Technológia leírása:	
Felhasznált anyagok:	
Szennyező anyagok:	
Potenciálisan exponált dolgozók száma:	

Műveleti sorszám	indul	leáll	Leírás
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			

Megjegyzés/Zavaró körülmények:

Környezeti levegő
19,6 °C
40,2 % rH
1009 mbar

Belső levegő
21,0 °C
33,5 % rH
1009 mbar