

INTRODUCTION

The following report summarizes the environmental diagnostic monitoring, executed by Sterionizer™ D6 Series system. Monitoring was executed in order to examine possible emission products that may be released during the operation of the above apparatus.

MONITORING STRATEGY

In order to estimate the materials and the elements that may be emitted during the process, we chose a room to be used as an office (the apparatus is designated to be used for offices). The room was sampled for several hours prior to operating the system, as a baseline for pollutants present in the room. Pollutants that may penetrate into the atmosphere of the room, from the external atmosphere, as well as pollutants that may be emitted from the office furniture or instruments present in the room. After this process (establish baseline pollutants) the apparatus was introduced into the room and tested with the same criteria as the baseline tests while the apparatus functioned. This test also continued for several hours.

At the end of the monitoring the receptors and the blank receptors were sent for analysis deciphering in the "Chemical Lab" laboratory.

METHODS AND INSTRUMENTS

The monitoring focused on compounds from the organic solvent family. In order to perform monitoring VOC – Thermal desorption EPA TO-17 was used to determine compounds from the organic solvent family, both qualitatively - type of compound and quantitatively – concentration of compound.

Monitoring performed with the help of a personal pump of Gilian type connected to a designated receptor, monitoring tube TO-17. The pump is calibrated in advance to the possible compounds required for this type of monitoring.

The pump is calibrated using a calibration system of the type DryCal from Bioss company.

VOC – THERMAL DESORPTION EPA – TO-17 METHOD

Analysis method is based on a GC-MS instrumentation, equipped Mass detector. Principle of the method is heating the tube and flow of gas to release the materials and concentrating them in order to separate, identify and quantify them.

For each of the results (compounds found in this monitoring) the discovery threshold and quantification are different (LOD LOQ)

Average discovery threshold LOD is 1 nanograms.

Average quantitative threshold LOQ is 5 nanograms.

CAS	Compound Name	תוצאות mg/m3
115-07-1	Propene	0.003
7446-09-5	Sulfur dioxide	0.00001
6232-21-9	Aminocyanoacetic acid	<0.00001
75-19-4	Cyclopropane	0.00001
107-12-0	Propanenitrile	<0.00001
556-52-5	Glycidol	0.00001
74-83-9	Methane, bromo-	<0.00001
2918-13-0	1-Hepten-3-one	<0.00001
109-66-0	Pentane	<0.00001
57905-86-9	Cyclobutane, 1,1,2,3,3-pentamethyl-	<0.00001
107-19-7	2-Propyn-1-ol	<0.00001
5685-47-2	Cyclopropane, 1,1'-methylenebis-	<0.00001
115-10-6	Dimethyl ether	0.00002
110-00-9	Furan	<0.00001
76-13-1	Ethane, 1,1,2-trichloro-1,2,2-trifluoro-	<0.00001
74-88-4	Methane, iodo-	<0.00001
74-96-4	Ethane, bromo-	<0.00001
107-02-8	2-Propenal	0.00001
79-24-3	Ethane, nitro-	0.00011
627-48-5	Cyanic acid, ethyl ester	<0.00001
109-90-0	Ethane, isocyanato-	<0.00001
67-64-1	Acetone	0.0001
61141-71-7	6-Hepten-3-one, 5-hydroxy-4-methyl-	<0.00001
1000306-03-5	Phosphinic acid, diethyl-, methyl ester	<0.00001
75-05-8	Acetonitrile	<0.00001
106-69-4	1,2,6-Hexanetriol	<0.00001
4426-31-7	Borinic acid, diethyl-	<0.00001
71-23-8	1-Propanol	<0.00001
1701-77-5	Benzeneacetic acid, .alpha.-methoxy-	<0.00001
123-73-9	2-Butenal, (E)-	<0.00001
78-85-3	Methacrolein	<0.00001
623-50-7	Acetic acid, hydroxy-, ethyl ester	0.00008
109-86-4	Ethanol, 2-methoxy-	0.00005
1000192-28-3	Tetrahydrofuran-5-on-2-methanol, .alpha.-{.alpha.-methoxy-(tetrahydrofuran-5-on-2-ylmethoxy)}-	<0.00001
616-45-5	2-Pyrrolidinone	<0.00001
56954-77-9	Benzoic acid, 3-methoxy-, eicosyl ester	<0.00001
107-11-9	2-Propen-1-amine	<0.00001
141-78-6	Ethyl Acetate	0.00001
1071-81-4	Hexane, 2,2,5,5-tetramethyl-	<0.00001
431-03-8	2,3-Butanedione	<0.00001
89-91-8	Acetic acid, dimethoxy-, methyl ester	0.00002

CAS	Compound Name	תוצאות mg/m3
24425-40-9	5-Aminoindan	0.00002
624-83-9	Methane, isocyanato-	<0.00001
142-82-5	Heptane	0.00001
7422-88-0	Acetaldehyde, propylhydrazone	<0.00001
78-83-1	1-Propanol, 2-methyl-	<0.00001
110-02-1	Thiophene	<0.00001
3208-16-0	Furan, 2-ethyl-	<0.00001
6159-22-4	Oxazole, 4,5-dihydro-2,5-dimethyl-	<0.00001
7475-92-5	3,4-Dimethyldihydrofuran-2,5-dione	<0.00001
4806-61-5	Cyclobutane, ethyl-	<0.00001
563-78-0	1-Butene, 2,3-dimethyl-	<0.00001
1763-21-9	1,5-Hexadiene, 3,3,4,4-tetrafluoro-	<0.00001
19078-97-8	2,2-Dimethyl-3-heptanone	<0.00001
1000331-11-3	Cyclobutanecarboxylic acid, 2-diethylaminoethyl ester	<0.00001
110-62-3	Pentanal	<0.00001
96-22-0	3-Pentanone	<0.00001
111-65-9	Octane	<0.00001
106-36-5	Propanoic acid, propyl ester	<0.00001
108-88-3	Toluene	<0.00001
19036-99-8	Pyridine, 2-(2-(4-methoxyphenyl)ethenyl)-, trans-	0.00002
56015-26-0	2-Phenyl-3-methyl-pyrrolo(2,3-b)pyrazine	0.00002
1000343-74-4	6-Fluoro-2-trifluoromethylbenzoic acid, 2-formyl-4,6-dichlorophenyl ester	0.00007
88-14-2	2-Furancarboxylic acid	<0.00001
488-93-7	3-Furancarboxylic acid	<0.00001
1000192-66-9	3-Benzoyl-2-t-butyl-4-methyl-oxazolidin-5-one	<0.00001
108-10-1	Methyl Isobutyl Ketone	<0.00001
1080123	2-Chloromethylbenzimidazole	<0.00001
344-07-0	Benzene, chloropentafluoro-	<0.00001
13905-10-7	4-Hexen-3-one, 5-methyl-	<0.00001
1000351-99-9	2-[2-[2-(2,2,3,3,3-Pentafluoropropanoyl)oxyethoxy]ethoxy]ethyl 2,2,3,3,3-pentafluoropropanoate	<0.00001
84-62-8	1,2-Benzenedicarboxylic acid, diphenyl ester	<0.00001
696-75-3	trans-1,2-Cyclopropanedicarboxylic acid	<0.00001
3147-62-4	3,5-Dihydroxybenzamide	<0.00001
109-69-3	Butane, 1-chloro-	<0.00001
66-25-1	Hexanal	<0.00001
1000310-36-4	2-Methoxybenzylamine, N,N-dibutyl-	<0.00001
42215-29-2	4(1H)-Pyridinone, 1,2,6-trimethyl-3,5-diphenyl-	<0.00001
59643-68-4	3,5-Dimethyl-3-heptene	<0.00001

CAS	Compound Name	תוצאות mg/m3
4291-79-6	Cyclohexane, 1-methyl-2-propyl-	<0.00001
100-41-4	Ethylbenzene	<0.00001
2517-44-4	Ethane, 1,1,2,2-tetramethoxy-	<0.00001
23190-16-1	(1R,2S)-(-)-2-Amino-1,2-diphenylethanol	<0.00001
624-95-3	1-Butanol, 3,3-dimethyl-	<0.00001
17312-76-4	Undecane, 6,6-dimethyl-	<0.00001
1000315-41-2	Phthalic acid, cyclobutyl propyl ester	<0.00001
78-94-4	Methyl vinyl ketone	<0.00001
285-76-7	1-Azabicyclo[3.1.0]hexane	<0.00001
13388-93-7	Ethanone, 1-(1-methylcyclopentyl)-	<0.00001
764-42-1	2-Butenedinitrile, (E)-	<0.00001
100-42-5	Styrene	<0.00001
64419-14-3	N-(4-Methoxyphenyl)-thiophene-2-carboxamide	<0.00001
4889-83-2	Bicyclo[3.1.1]hept-2-ene, 3,6,6-trimethyl-	<0.00001
54773-05-6	N-Ethyl-2-carbethoxyazetidine	<0.00001
871-83-0	Nonane, 2-methyl-	<0.00001
1465084	Nonane, 3-methyl-	<0.00001
103-73-1	Benzene, ethoxy-	<0.00001
79-92-5	Camphene	<0.00001
77764-89-7	3(2H)-Benzofuranone, 2-[(3-chlorophenyl)methylene]-6-methoxy-, (E)-	<0.00001
520-18-3	Kaempferol	<0.00001
111-71-7	Heptanal	<0.00001
2043-26-7	2-Pyrrolidinone, 1-(1-oxo-2-propenyl)-	<0.00001
124-18-5	Decane	<0.00001
26964-53-4	2-Pyrazoline, 1-isobutyl-3-methyl-	<0.00001
22581-50-6	2-Pyrazoline, 1-butyl-5-methyl-	<0.00001
15376-40-6	Bis(2-hydroxy-2,4,6-cycloheptatriene-1-onato-o,o')beryllium	<0.00001
611-14-3	Benzene, 1-ethyl-2-methyl-	<0.00001
10276-09-2	3-Butenoic acid, 2,2-dimethyl-	<0.00001
526-73-8	Benzene, 1,2,3-trimethyl-	<0.00001
1000273-28-7	Methylphosphonic acid, fluoroanhydride, 2-ethylcyclohexyl ester	<0.00001
695-12-5	Cyclohexane, ethenyl-	<0.00001
1000330-03-1	Succinic acid, di(4-chlorophenyl) ester	<0.00001
7154-80-5	Heptane, 3,3,5-trimethyl-	<0.00001
1629-60-3	1-Hexen-3-one	<0.00001
1567-75-5	Methyl 1-methylcyclopropyl ketone	<0.00001
13258-63-4	4-(2-Aminoethyl)pyridine	<0.00001
1000282-63-7	Benzeneacetic acid, 1-cyclopentylethyl ester	<0.00001
123-05-7	Hexanal, 2-ethyl-	<0.00001
3143-02-0	3-Methyl-3-oxetanemethanol	<0.00001
98-82-8	Benzene, (1-methylethyl)-	<0.00001

CAS	Compound Name	תוצאות mg/m3
1000132-12-3	3-Hexen-1-ol, 2,5-dimethyl-, formate,(Z)-	<0.868
1000298-83-6	4-Azaphenanthrene, 1-methyl-3-phenylethynyl-	<0.00001
5989-27-5	D-Limonene	<0.00001
565-80-0	3-Pentanone, 2,4-dimethyl-	<0.00001
6975-98-0	Decane, 2-methyl-	<0.00001
69393-15-3	1-Pentanone, 1-(1H-imidazol-4-yl)-	<0.00001
3194-17-0	1-Pentanone, 1-(2-furanyl)-	<0.00001
99-83-2	.alpha.-Phellandrene	<0.00001
25552-17-4	1-Hexanone, 5-methyl-1-phenyl-	<0.00001
287-23-0	Cyclobutane	<0.00001
124-13-0	Octanal	<0.00001
17302-32-8	Nonane, 3,7-dimethyl-	<0.00001
94-04-2	Vinyl 2-ethylhexanoate	<0.00001
616-44-4	Thiophene, 3-methyl-	<0.00001
1269006	4,6-di-tert-Butylresorcinol	<0.00001
1000239-79-3	trans-2-(p-Acetamidostyryl)-5-ethyl-pyridine	<0.00001
3273-14-1	1-(2-Hydroxyethyl)-1,2,4-triazole	<0.00001
16747-31-2	Hexane, 3,3,4-trimethyl-	<0.00001
1000307-59-8	3-Methylbut-2-enoic acid, 4-nitrophenyl ester	<0.00001
72437-60-6	Disulfide, ethyl isopentyl	<0.00001
19744-64-0	1H-Indene, octahydro-5-methyl-	<0.00001
3282-53-9	Cyclohexene, 1-butyl-	<0.00001
49747-05-9	8-Oxabicyclo[3.2.1]oct-6-en-3-one, 2,4-dimethyl-	<0.00001
1000152-47-3	trans-Decalin, 2-methyl-	<0.00001
37526-58-2	3-Methoxy-7-methyl-7H-pirazolo[4,3-E]1,2,4]triazine	<0.00001
1671-77-8	1-Pentanone, 1-(4-methylphenyl)-	<0.00001
112-40-3	Dodecane	<0.00001
7045-71-8	Undecane, 2-methyl-	<0.00001
1000152-79-7	Cyclopentane, 1,2,3,4,5-pentamethyl-	<0.00001
1000272-49-3	Furane-2-carboxylic acid, (4-formyl-2,6-dimethoxy)phenyl ester	<0.00001
1000325-60-0	4-Methylbenzoic acid, 3-pentyl ester	<0.00001
865-66-7	2-Pentanone, 3,3,4,4-tetramethyl-	<0.00001
53229-40-6	2,2,3-Triethyloxirane	<0.00001
629-50-5	Tridecane	<0.00001
39701-82-1	Oleane-12,15-dien-28-oic acid, 3-(acetyloxy)-, methyl ester, (3.beta.)-	<0.00001
54166-32-4	Octane, 2,6,6-trimethyl-	<0.00001
562-49-2	Pentane, 3,3-dimethyl-	<0.00001
127204-12-0	Dodecane, 2,2,11,11-tetramethyl-	<0.00001
97851-14-4	4-Biphenylol, 3,3'-dinitro-	<0.00001

CAS	Compound Name	תוצאות mg/m ³
544-76-3	Hexadecane	1.102
97-72-3	Propanoic acid, 2-methyl-, anhydride	<0.00001
288-88-0	1H-1,2,4-Triazole	<0.00001
1000307-29-4	Hexanamide, N-(1-naphthyl)-	<0.00001
68364-38-5	5-Cyano-2-methyl-4-methylthio-6-phenylpyrimidine	<0.00001
1000340-00-1	Carbonic acid, monoamide, N-(4-phenoxyphenyl)-, neopentyl ester	<0.00001
1703-51-1	3,6-Heptanedione	<0.00001
7428-83-3	Benzo(a)pyren-6-amine	<0.00001

SUMMARY REPORT

Client:	Generion LTD. Alave ABBA, Israel	Work Order:	22MIS070
		Date Received:	January 12, 2022
		Date Analyzed:	January 17-19, 2022
		Date Reported:	January 22, 2022
Submitted By:	Ari Cohen	Analysis:	Hydrogen Peroxide
Client's reference:	Test of Hydrogen Peroxide Emission	Reference Procedure:	OSHA 1019

Introduction:

LCS Laboratory Inc. (Laboratory), was commissioned to measure accumulation of Hydrogen Peroxide in air during operation of "D6 Chip" Sterionizer D6 Series, Model No: IG3-025V-C33.Rev.C. Batch No.116 Client specified that testing should be performed in accordance to OSHA 1019 method. Generion LTD. provided the device for testing.

Experimental Setup:

Laboratory assembled aluminum lined environmental chamber with dimensions of 120x120x120cm

The device was placed inside the chamber, connected to the power line, and tested to be operational. A household fan was placed at the distance of about 1m from the device to provide forced air circulation. The equipment was sealed inside the chamber for the duration of the test.

Samples of air were collected at a flow rate of 2 L/min for a duration of 2 hours each. For quality control purposes, one sample of the laboratory air was collected to demonstrate absence of the hydrogen peroxide in the ambient air.

In a separate experiment, the device was running inside a 12 L enclosure. In both experiments, the Hydrogen Peroxide in air was collected through the sampling port of the environmental chambers.

Environmental Conditions: Samples were collected on December 9 and 10, 2021. Ambient temperature was T=22°C and relative humidity was RH=20%

Pump calibration and duration of sampling: Air sampling pump was calibrated before and after sampling. The following volumes of air were collected

Table 1.

Client Sample ID #	Laboratory Sample ID #	Pre-Calibration L/min	Post-Calibration L/min	Duration min	Client Sample ID #
Sample 1	22MIS070-HP-1	1.99	2.19	120	Sample 1
Sample 2	22MIS070-HP-2	1.99	2.19	126	Sample 2

Client Sample ID #	Laboratory Sample ID #	Pre-Calibration L/min	Post-Calibration L/min	Duration min	Client Sample ID #
Sample 3	22MIS070-HP-3	1.99	2.19	125	Sample 3
Sample 4	22MIS070-HP-4	1.99	2.19	120	Sample 4
Sample 5	22MIS070-HP-5	1.99	2.19	120	Sample 5
Sample 6	22MIS070-HP-6	1.99	2.19	120	Sample 6
Sample 7	22MIS070-HP-7	1.99	2.19	120	Sample 7
Sample 8	22MIS070-HP-8	1.99	2.19	115	Sample 8

Experimental Results:

Laboratory results are provided on the certificate of analysis.

Test in a Larger Chamber (Air Volume 1728L)

To achieve the desirable sensitivity samples were collected for 2 hours. Once the first sample was collected the cassette was replaced with a fresh one. This was repeated for the duration of 8 hours.

Table 2.

Client Sample ID #	Description	Air Volume L	Hydrogen $\mu\text{g}/\text{sample}$	Peroxide ppm in air
Sample 1	Ambient air	251	<RL	<0.008
Sample 2	0-126 min of operation	263	<RL	<0.008
Sample 3	126-251 min of operation	261	<RL	<0.008
Sample 4	251-371 min of operation	251	<RL	<0.008
Sample 5	371-491 min of operation	251	<RL	<0.008
Reporting Limit (RL)		-	RL=3	-
Laboratory Blank		-	<RL	-

Test in a Smaller Chamber (Air Volume 12L)

In a different experiment, 3 more samples were collected from the device operating in a 12L enclosure. Once the first sample was collected the cassette was replaced with a fresh one. This was repeated for the duration of 7 hours.

Table 2.

Client Sample ID #	Description	Air Volume L	Hydrogen $\mu\text{g}/\text{sample}$	Peroxide ppm in air
Sample 6	0-120 min of operation	251	<RL	<0.008
Sample 7	120-240 min of operation	251	<RL	<0.008
Sample 8	240-355 min of operation	240	<RL	<0.008
Reporting Limit (RL)		-	RL=3	-
Laboratory Blank		-	<RL	-

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Conclusions:

-Hydrogen peroxide concentration in air did not exceed 0.008 ppm in any given test.
-Concentrations of the Hydrogen Peroxide during the test were at least 100 times lower than Occupational (Industrial) exposure limit of 1 ppm as defined in: Ontario Canada (2019, Occupational Exposure Limits for Ontario Workplaces, Regulation 833); USA (2019, OSHA PEL, OSHA Annotated Table Z-1)

A handwritten signature in black ink, appearing to read "Raisa", written over a horizontal line.

Analyst: Raisa Stadnichenko, Ph.D.

A handwritten signature in black ink, appearing to read "Stepan", written over a horizontal line.

Reviewer: Stepan Reut, Ph.D.