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**AUDIT CHECK LIST OF THE “CERTIFICATION
PROCESS OF MICROALGAE IN
ENVIRONMENTAL IMPROVEMENT IN CLOSED
PREMISES” GRUPO EULEN**

COMPANY NAME	GRUPO EULEN
DIRECTION	Avda. De la Reina Mercedes, 10. Sevilla
VISIT DATE	22-03-2021
SECOND VISIT DATE	23-03-2021
RESPONSIBLE	BORJA DANIEL GONZALEZ GONZALEZ
JOB	RESPONSABLE GRUPO EULEN

Produced by BUREAU VERITAS INSPECCIÓN Y TESTING,
S.L.U.:



Técnico de Prevención de Riesgos Laborales
María Garrido Juárez
Date: 30/03/2021

EULEN
Received and compliant

1. OBJETIVE

The purpose of this Check list is to serve as a tool to record all the necessary data from the audit carried out to the EULEN company for the certification of the internal testing process to verify the possible environmental improvement in closed areas by means of microalgae, the tests and The audit will be carried out at the facilities of the Higher Council for Scientific Research (CSIC) at Avda. De la Reina Mercedes, 10. Seville, Spain.

PHOTOS will be made to include in the report.

2. AUDIT

Personnel involved in the process (full name is requested and the operations to be carried out are summarized):

- MANUEL ANTONIO GONZALE DEL VALLE
- BORJA DANIEL GONZALEZ GONZALEZ

Measurement instruments (* the measurement instruments must match the one that appears in annex III)	Yes	No	NA	Observations
Portable air quality measurement equipment for formaldehyde (HCHO mg / m3), volatile organic compounds (TVOC mg / m3), PM2.5, PM1.0, PM10, temperature and relative humidity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4-gas measuring equipment (O2 in%, EX in%, H2S in ppm and CO in ppm)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ONLY MEASURED IN PPM
Carbon dioxide (CO2), formaldehyde (HCHO), volatile organic compound (TVOC) in ppm and particulate matter (PM1 / PM2.5 / PM10.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Design of the experiment	Yes	No	NA	Observations
The measurements will be carried out in an anaerobic chamber, which is a sealed chamber with a capacity of 2 m3 with controlled conditions of temperature, relative humidity and gases.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Inside will be introduced	Yes	No	NA	Observations
A liquid algae culture, with white LED light and built-in aerator capable of moving the total volume of the algae culture.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
A fan capable of moving the volume of air contained in the chamber	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Producing material of monoxide and carbon dioxide (CO and CO ₂), this material as a result of combustion will also introduce H ₂ S.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	H₂S IS NOT INTRODUCED BECAUSE THE COMPOUND TO BE ADDED IS VERY TOXIC
Formaldehyde producing material (HCOH)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Volatile Organic Compound Producing Material (TVOC)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
A container with dust particles (PM 1, 2'5, 10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The measuring equipment placed in a support that allows them the maximum performance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

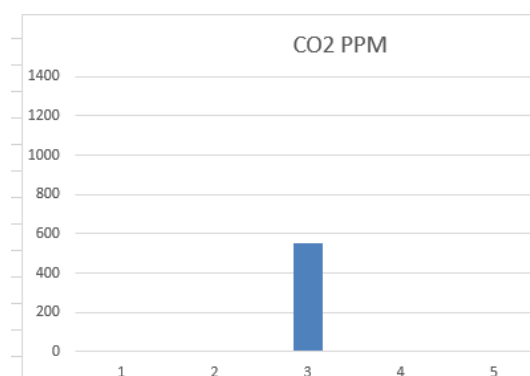
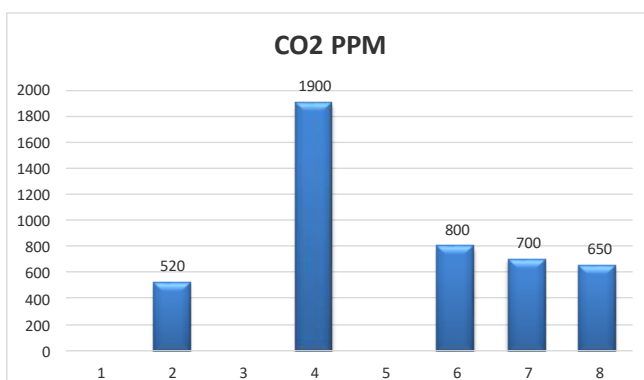
Indications	Sí	No	NA	Observaciones
Review of the system and preparation of the experiment.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Toma de valores iniciales e inicio del protocolo de medida	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Taking initial values and starting the measurement protocol	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Data collection at 2 am	<input checked="" type="checkbox"/>			
Data collection at 2 am	<input checked="" type="checkbox"/>			
After the necessary period, the final measure is taken. At 24h.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Analysis of data	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

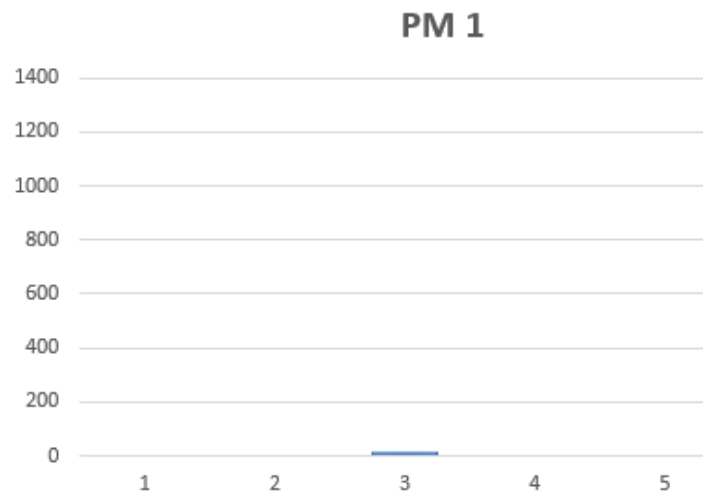
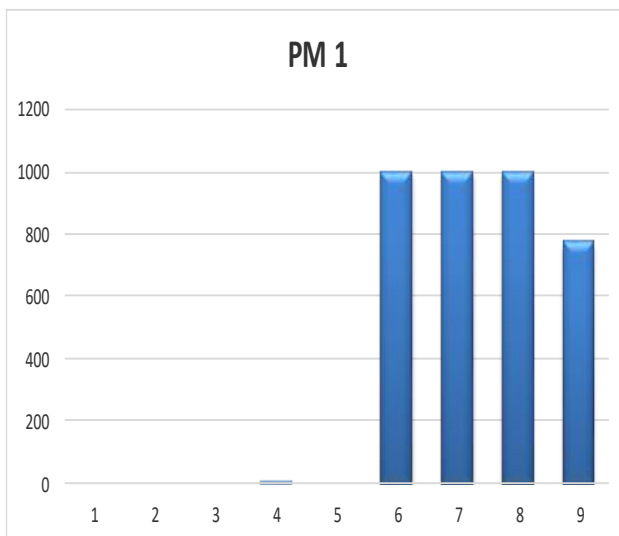
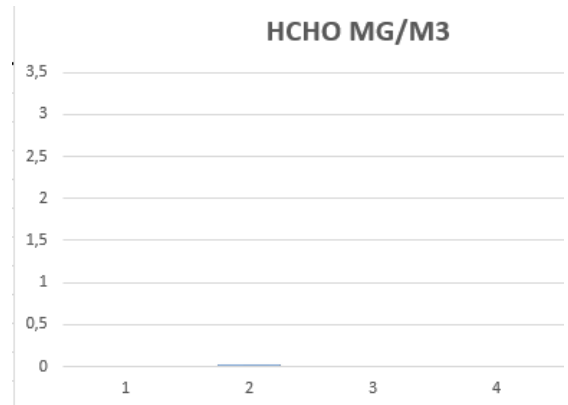
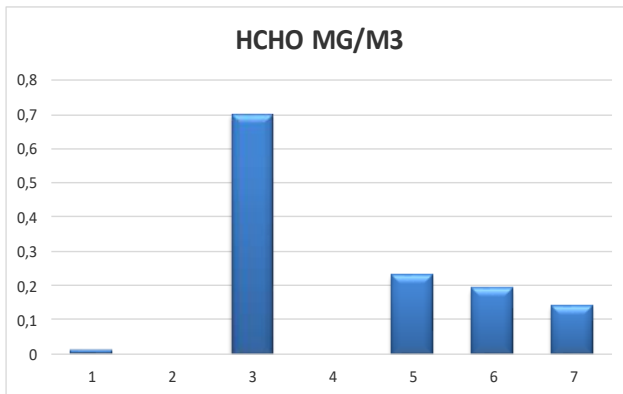
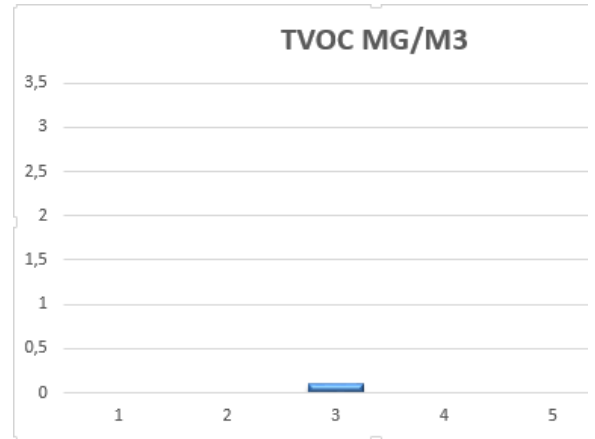
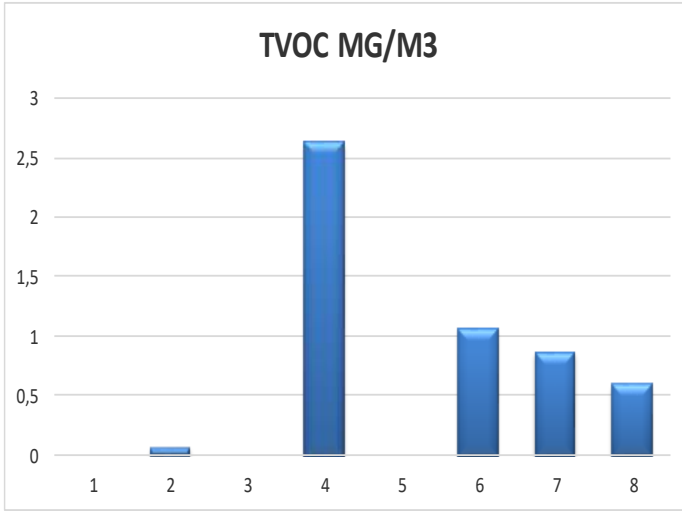
3. FINAL OBSERVATIONS AND CONCLUSIONS

After the experiment carried out at the IRNAS belonging to the CSIC, the effectiveness results are as follows:

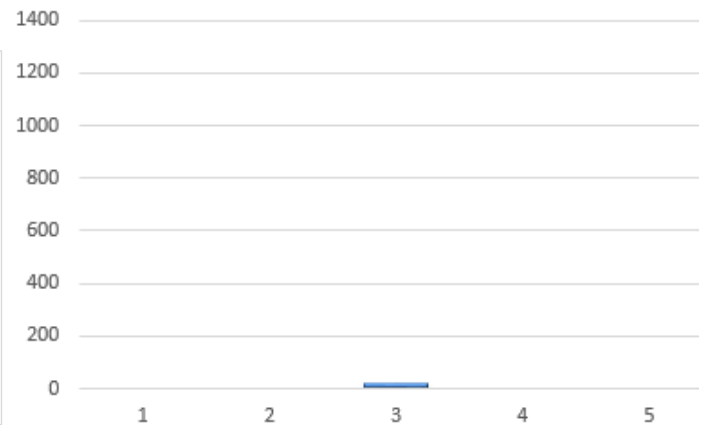
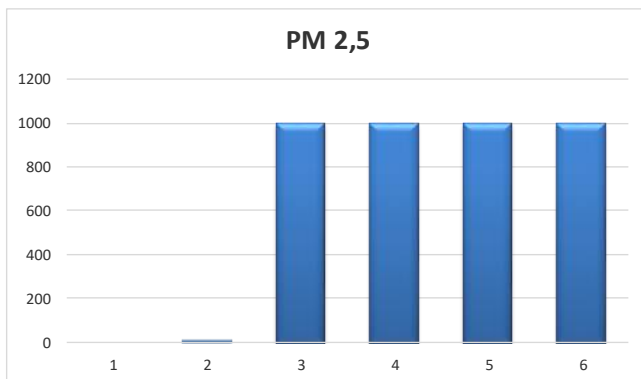
Co2: 72% effectiveness
 HCHO: 96% effectiveness
 Tvoc: 96% effectiveness
 PM10: 98% effectiveness
 PM 2,5: 98% effectiveness
 PM1: 98% effectiveness
 CO: 98% effectiveness

Below is the comparison expressed in graphs in 24 hours.

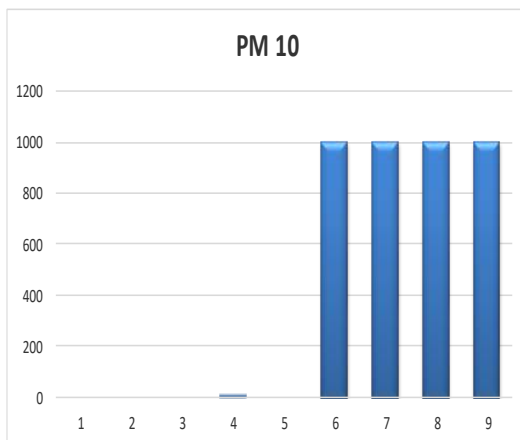




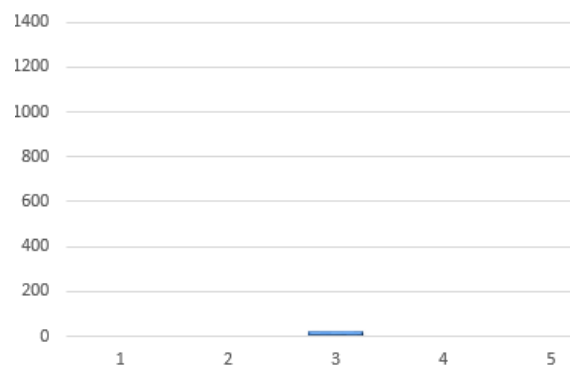
PM 2,5

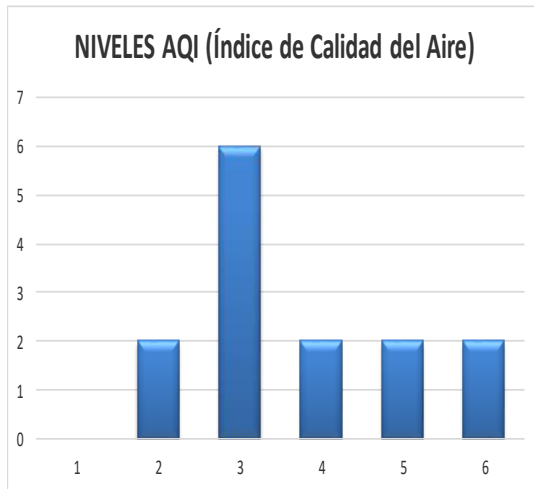
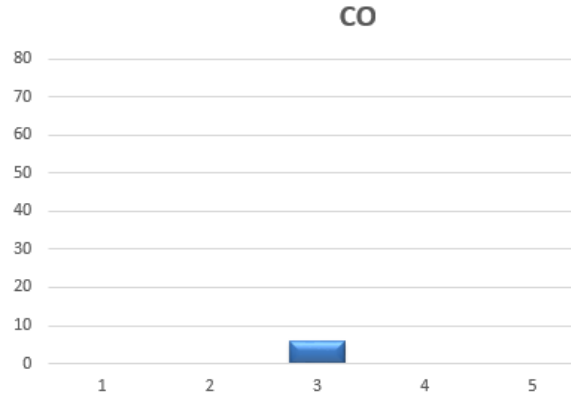
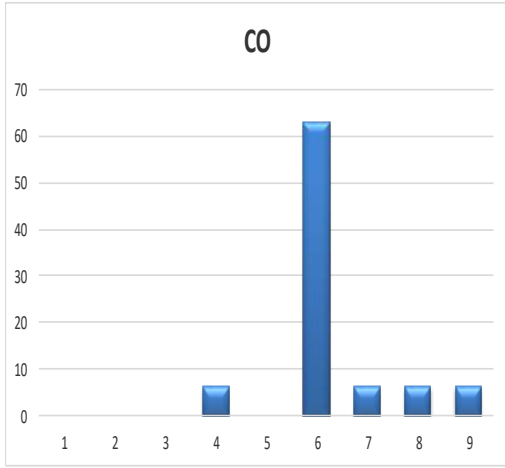


PM 10



PM 10





4. ANNEXES - RESULTS OF MEASUREMENTS

MEASUREMENTS									NIVELES AQI (Índice de Calidad del Aire)	TEMPERATURE	HUMIDITY
DATE 22.03	CO ₂ PPM	HCHO MG/M3	TVOC MG/M3	PM 1	PM 2,5	PM 10	O ₂	CO			
DATE MEASUREMENTS	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00	10:00
Result (Values 0) BEFORE MAKING THE INCENSE TEST	520	0,01	0,06	006	008	009	20,4- 20,9	0006	02	18°C	69%
Measurement Time (ONCE INCENSE PLACED)	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30
Result	1900	0,70	2,63	999	999	999	20,4- 20,9	063	06	19°C	69%
DATE MEASUREMENTS	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30
Result	800	0,23	1,06	999	999	999	20,4- 20,9	0006	02	19°C	76%
DATE MEASUREMENTS	14:30	14:30	14:30	14:30	14:30	14:30	14:30	14:30	14:30	14:30	14:30
Result	700	0,19	0,86	999	999	999	20,4- 20,9	0006	02	20°C	75%
DATE MEASUREMENTS	16:30	16:30	16:30	16:30	16:30	16:30	16:30	16:30	16:30	16:30	16:30
Result	650	0,14	0,59	775	999	999	20,4- 20,9	0006	02	20°C	77%

The data to be taken will be the parameters measured by the equipment provided by G2Galga solution



MEASUREMENTS	CO ₂ PPM	HCHO MG/M3	TVOC MG/M3	PM 1	PM 2,5	PM 10	O ₂	CO	NIVELES AQI (Índice de Calidad del Aire)	TEMPERATURE	HUMIDITY
DATE 23.03(*)											
DATE MEASUREMENTS	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30	10:30
Result	550	0,02	0,10	014	019	022	20,4-20,9	0006	02	17°C	79%

(*) The measurement must be carried out 24 hours after the first one.
The data to be taken will be the parameters measured by the equipment provided by G2Galga solution

4.2. PHOTO GALLERY

MEASURING APPARATUS



SEALING CHAMBER CONDITIONS BEFORE THE EXPERIMENT



TIGHT CHAMBER CONDITIONS WHEN SUBMITTING INCENSE- TIME 0

HOOR -10.30



HOOR -12.30



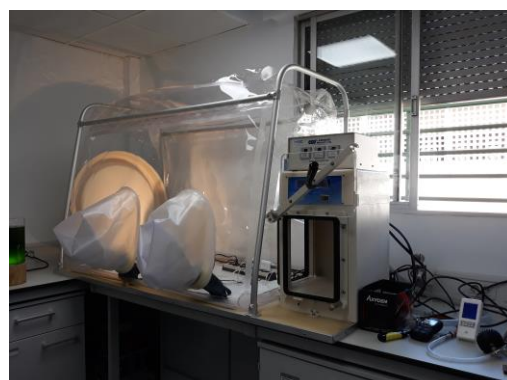
HOOR -14.30





HOUR -16.30



TIGHT ROOM CONDITIONS



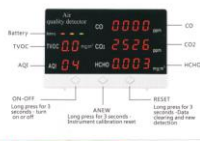
4.3. TECHNICAL SHEETS OF THE EQUIPMENT USED

MEASURING EQUIPMENT	TECHNICAL CHARACTERISTICS
	<p>Air quality monitor, IGERESS indoor air pollution detector meter for formaldehyde (HCHO mg / m3), volatile organic compounds (TVOCmg / m3), PM2.5, PM1.0, PM10, temperature and humidity, air test kit with colorful LCD screen. Brand IGERESS</p> <p>Product dimensions: length x width x height: 15 x 6.7 x 3.7 centimeters - Weight 170 grams</p>
	<p>Portable Gas Detector, Gas Clip 4-Gas Monitor Meter Tester Analyzer, Rechargeable LCD Screen Sound Light Shock Air Quality Tester.</p> <p>Portable 4-gas detector (O2 in%, EX in%, H2S in ppm and CO in ppm) with high quality imported gas sensor, excellent sensitivity and excellent repeatability, factory calibrated.</p> <p>Detection error better than $\leq \pm 5\%$ F.S. and response time: T <30s. Zero and span calibration options</p> <p>EXTERNAL ENVIRONMENTAL CONTROL</p>



Vogvigo Gas Analyzer Air Quality Monitor. It can accurately detect the air of carbon dioxide (CO₂), formaldehyde (HCHO), volatile organic compound (TVOC) in ppm and particulate matter (PM_{2.5} / PM₁₀). Works with a rechargeable lithium battery

Instrument details and introduction

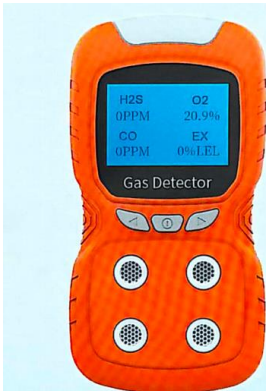


Air Quality Detector

New JSM-131 CO

Measurers HCHO, TVOC, CO₂, CO, AQI

Instrument details and introduction



Detector multi gas
measurers H₂s, CO, O₂.