APRIA systems

Innovation and technology
for a sustainable future

We are a technology-based company that provides consulting and engineering services focused on the treatment, purification, and valorization of liquid and gaseous streams through innovative technologies

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THE COMPANY

About us

Introduction

Our main objective is to offer **innovative alternatives for the treatment, purification and valorization of streams,** providing bespoke solutions to our clients.

INNOVATIVE SME
Valid until Nov 20th 2021

GOBIERNO DE ESPAÑA · MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

- SME innovative company founded in 2006 as a spin-off from R&D projects managed by the University of Cantabria.
- Activity strongly influenced by R&D actions.
- Highly specialized human resources, with more than 10 engineers.

Location

APRIA Systems S.L.

Parque Empresarial de Morero,
Parcela P.2-12, Nave 1 - Puerta 5

39611 Guarnizo, Cantabria, Spain

Our team

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Our values

Commitment

Our team works to offer our clients suitable solutions for their needs, **executing high-quality projects under the established terms and conditions.**

Modernity

APRIA Systems **continuously updates and improves its know-how** to offer cutting-edge solutions characterized by their optimal efficacy, yield, and environmental protection.

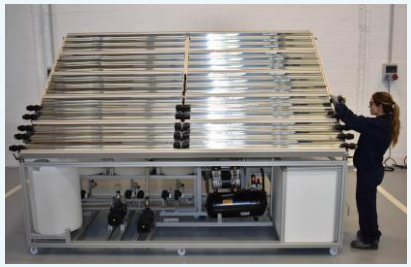
Service

We strive to provide a tailored and close service for each client and project. **Our service is flexible**, adaptable, and easily transferable to our clients' requirements and working methodology.

Sustainability

Our solutions aim to be **well balanced in terms of economic, social, and environmental aspects**. Our designs and proposals promote the minimization of raw material, energy consumption, and waste production, together with a high productivity and user-friendliness.

Main action fields



APRIA Systems aims to contribute to the sustainability of the current production model through tools like the knowledge, innovation, technology, creativity, capacity, and excellence.

SERVICES

Our services are flexible, adaptable, and easily transferable to our clients' requirements.

Grant funding

Our own **experience in participating in different R&D funding schemes, has given us a broad insight of funding opportunities** at European, national, and regional level. Therefore, we can take advantage of this experience to provide:

- Identification of funding opportunities.
- Design and redaction of a proposal aligned with the call requirements.
- Support for the project acceptation and follow-up.
- Assessment for the final justification.

Environmental consultancy

We can offer our **experience in fulfilling environmental regulations** as well as environmental assessment, including:

- Integrated Environmental Authorization.
- Compliance with regulations related with hazardous substances.
- Risk-based soil quality assessment.
- Strategies for adequate water reclaim and reuse.

R&D to improve processes and products

If you have a challenge related to the enhancement of a process or product that cannot be solved using traditional approaches, we can evaluate your case and offer you cutting-edge technologies to solve it:

- Identification of feasible alternatives from a technical point of view.
- Definition of critical parameters through tests and studies.
- Economic assessment of the alternatives, allowing hierarchical organization.

Scale-up of innovative technologies

For those technologies that offer positive outcomes to our clients, we provide engineering services for its integration in current industrial facilities:

- Advising of the technology implementation.
- Design of the solution to meet customer requirements –adaptation to the specific industrial process–.
- Construction and assembly of the equipment.
- Start up.

PRODUCTS

Our know-how allows us to act as technological supplier of a wide range of tailored equipment always customized based on the needs of each client.

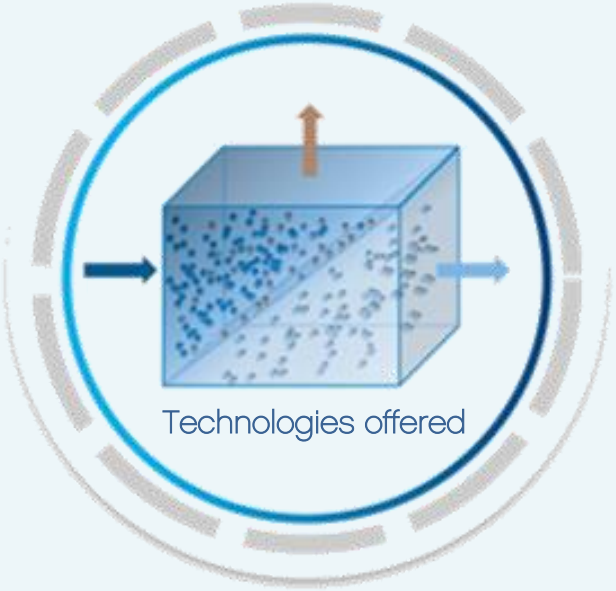
We are specialized in providing cutting-edge technologies, mainly based on membranes or advanced oxidation processes. However, under petition, our extensive experience in the area of chemical engineering allow us to offer equipment based on other technologies.

Moreover, we commercialize ELOXIRAS®, a novel process for the treatment and reuse of marine and brackish water in the aquaculture industry.

Based on membranes

Introduction

Membrane technology is commonly employed in advanced separation processes. The use of semipermeable membranes allows the generation of two streams, retentate and permeate. APRIA Systems designs and supplies, from lab scale up to industrial scale, membrane separation facilities as single stage or integrated in hybrid processes.



- Microfiltration
- Ultrafiltration
- Nanofiltration
- Reverse osmosis
- Forward osmosis
- Pressure retarded osmosis
- Membrane distillation
- Gas permeation
- Electrodialysis

Available models

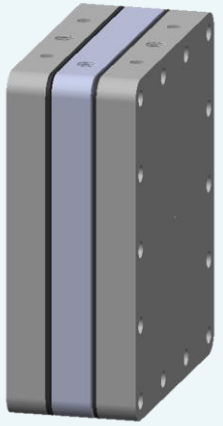
We select the most suitable membranes and modules for each application.

Moreover, we know that each project has its specific needs, so in those cases that require it, **we design and manufacture completely customized membrane modules.**

Technology/ies:
Microfiltration (MF)
Nanofiltration (NF)
Ultrafiltration (UF)
Reverse osmosis (RO)
Forward osmosis (FO)
Pressure retarded osmosis (PRO)
Membrane distillation (MD)
Gas permeation (GP)
Electrodialysis (ED)

Mem
lab / bench / ind
(1) - (2)

Membrane area:
50 (50 cm^2), 900 (900 cm^2), etc.



Membrane technology	Electrodialysis (ED) / Forward osmosis (FO) / Gas permeation (GP) /Membrane distillation (MD) / Microfiltration (MF) / Nanofiltration (NF) /Pressure retarded osmosis (PRO) / Reverse osmosis (RO) / Ultrafiltration (UF)
Configuration	Plate-and-frame / Hollow-fiber / Spiral wound / Tubular
Volume of treatment / flow rate	Selectable
Operation mode	Alternating / Batch / Continuous
Scale	Laboratory / Pilot / Industrial
Membrane material	Ceramic / Polymeric
Case material	Polycarbonate / Polypropylene (PP) / Stainless steel
Sealing gaskets material	Ethylene propylene diene monomer (EPDM) / Thermoplastic polyurethane (TPU) / Viton®
Connection type	Barb fitting / Quick plug
Optional features	Automatization / Online measurements (pH, O_2, conductivity, etc.) / Temperature control

References of built equipment

Membench UF-400000/RO-79000

Memlab FO-100/PRO-100

Memlab MD-250

Membench GP-470

Based on advanced oxidation

Introduction

Advanced oxidation processes (AOPs) are characterized by the in-situ generation of chemical species with a high oxidation power, mainly hydroxyl radicals.

We have extensive experience in the design, construction, and commissioning of **equipment based on one or several advanced oxidation processes** from laboratory to industrial scale.

Photochemical

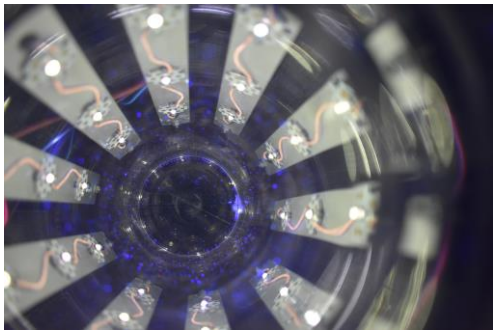
- Photocatalysis
- Photo-Fenton
- UV/H_2O_2

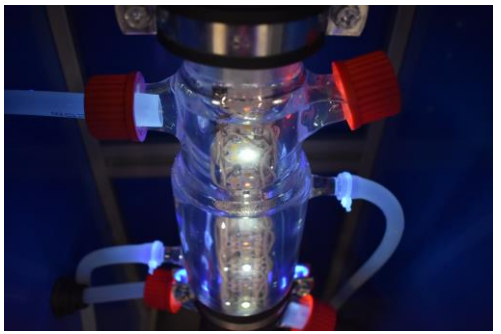
Electrochemical

- Electrooxidation
- Electro-Fenton

Photoelectrochemical

- Photoelectrocatalysis
- Photoelectro-Fenton





Available models: photochemical

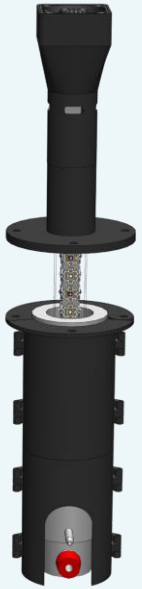
APRIA Systems applies **cutting-edge light emitting diodes (LED) technology** in the equipment to promote the treatment with a minimum energy consumption.

The amount of radiation emitted can be regulated and adjusted to the needs of the oxidation process under study.

The temperature of the LED is monitored and controlled through a system of forced air convection, allowing to maximize the efficiency and lifetime of the LED.

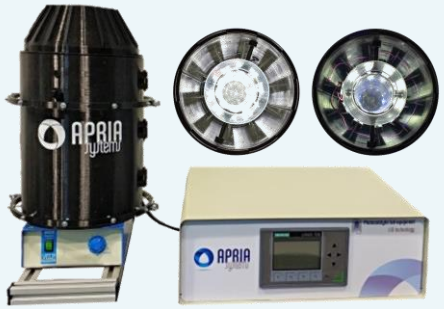
Photo
lab / bench / ind
LED (1) - (2) (3)

- Maximum wavelength emission: 365 (365 nm), 450 (450 nm), etc.
- Total irradiated power: 10 (10 W), 25 (25 W), 50 (50 W), etc.
- Photoreactor configuration: a (annular), b (box), c (cstr), p (plate), etc.



Technologies	Photocatalysis / Photo-Fenton / UV/H_2O_2
Technology of the light source	LED
Reactor configuration	Annular photoreactor / Box / CSTR / Plate
Source of light configuration	External radiation / External + internal radiation / Internal radiation
Volume of treatment / flow rate	Selectable
Operation mode	Alternating / Batch / Continuous
Radiation type	UV-A / UV-B / UV-C / visible / IR
Scale	Laboratory / Pilot / Industrial
Radiant flux	Adjustable through an electric console with PLC
Refrigeration system for the LED	Forced air convection
Reactor material	Borosilicate / Methacrylate / Quartz / Stainless steel
Sealing gaskets material	EPDM / TPU / Viton®
Connection type	Barb fitting / Quick plug
Optional features	Automatization / Online measurements (pH, O_2, etc.) / Jacketed reactor / Mirror finish / System for the recovery of the photocatalyst / Temperature control

References of built equipment: photochemical



Photolab LED365-24c //
Photolab LED450-24c

Photolab LED365-16/450-16c

Photolab LED365-1/450-1p

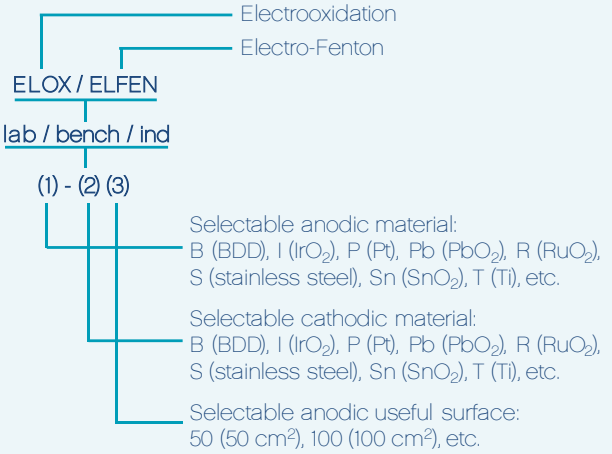
Photolab LED365-32a

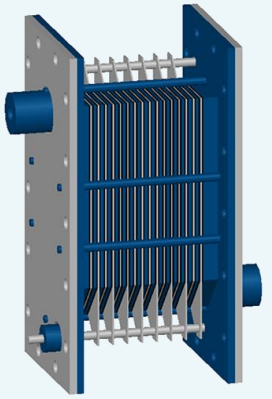
Photobench LED365-48/450-48a/CPC2

Photobench LED365-64a/CPC5

Available models: electrochemical

APRIA Systems designs customized electrochemical cells, being possible to select their configuration, their active anodic area, and the materials of the electrodes. In addition, thanks to its simple connection by quick plug or barb fitting, our equipment offers the possibility of easily exchanging the cells, allowing you to apply the electrochemical treatment with different electrodes in a single equipment.



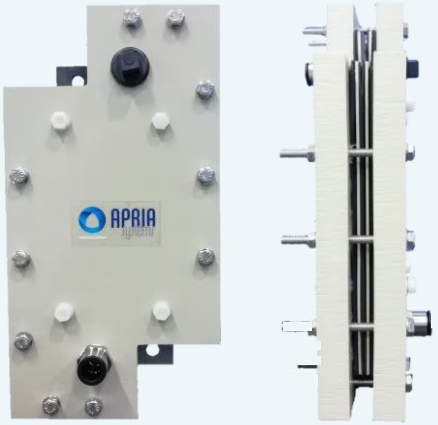


Technologies	Electrooxidation / Electro-Fenton
Configuration	Plate and frame
Volume of treatment / flow rate	Selectable
Operation mode	Alternating / Batch / Continuous
Scale	Laboratory / Pilot / Industrial
Anodic useful surface	Selectable
Separation between electrodes	Adjustable and selectable (> 1 mm)
Number of compartments	Selectable
Electrodes material	BDD / IrO_2 / Pt / PbO_2 / RuO_2 / Stainless steel / SnO_2 / Ti
Case material	Polypropylene / Stainless steel
Sealing gaskets material	EPDM / TPU / Viton®
Connection type	Barb fitting / Quick plug
Optional features	Automatization / Online measurements (pH, O_2, etc.) / Temperature control

References of built equipment: electrochemical

ELOXlab B-T170 // ELOXlab P-T170
// ELOXlab R-T170

ELOXlab B-B50



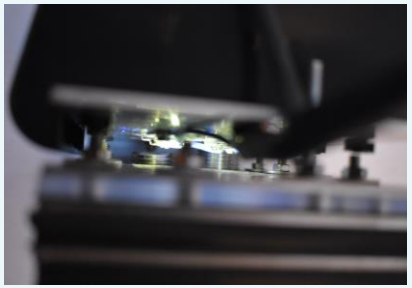
ELOXlab B-S210

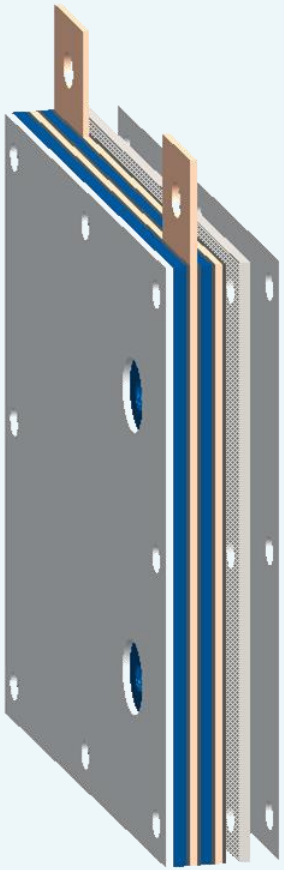
Photolab LED365-16/450-16a/ELOXlab B-S210

ELOXbench R-R4900

Available models: photoelectrochemical

We use **LED technology as source of light**, being the amount of radiation emitted adjustable to the needs of the treatment. Regarding the electrodes, **the client can select their active anodic area, configuration, and materials.**





PE

lab / bench / ind

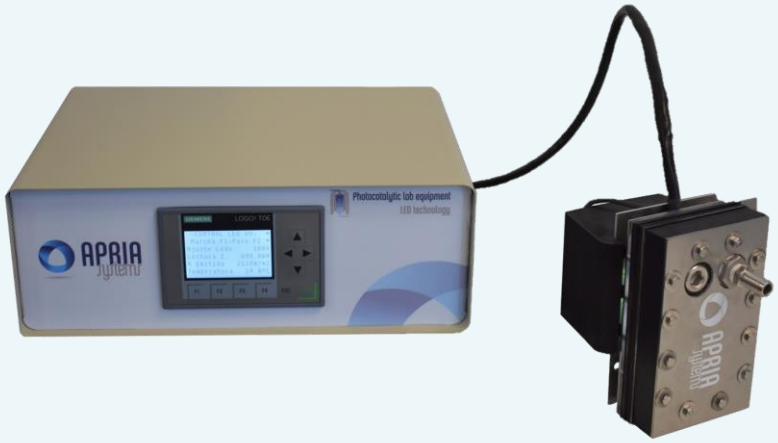
LED (1) - (2) (3) / (4) - (5) (6)

- Selectable anodic useful surface:
  50 (50 cm^2), 100 (100 cm^2), etc.
- Selectable cathodic material:
  B (BDD), I (IrO_2), P (Pt), Pb (PbO_2), R (RuO_2), S (stainless steel), Sn (SnO_2), T (Ti), etc.
- Selectable anodic material:
  B (BDD), I (IrO_2), P (Pt), Pb (PbO_2), R (RuO_2), S (stainless steel), Sn (SnO_2), T (Ti), etc.
- Maximum wavelength emission:
  365 (365 nm), 450 (450 nm), etc.
- Total irradiated power:
  10 (10 W), 25 (25 W), 50 (50 W), etc.
- Photoreactor configuration:
  a (annular), b (box), c (cstr), p (plate), etc.

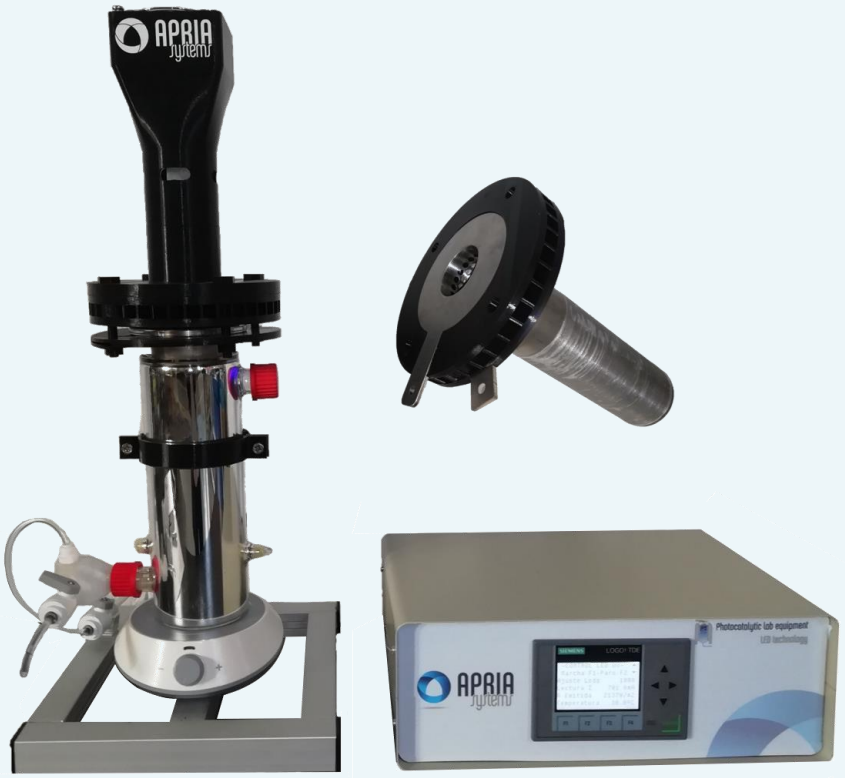
Available models: photoelectrochemical

Technologies	Photoelectrocatalysis / Photoelectro-Fenton
Source of light technology	Light emitting diodes (LED)
Reactor configuration	Annular / Plate and frame
Source of light configuration	External radiation / External + internal radiation / Internal radiation
Volume of treatment / flow rate	Selectable
Operation mode	Alternating / Batch / Continuous
Scale	Laboratory / Pilot / Industrial
Radiation type	UV-A / UV-B / UV-C / visible / IR
Radiant flux	Adjustable through an electric console with PLC
Refrigeration system for the LED	Forced air convection
Anodic useful surface	Selectable
Separation between electrodes	Adjustable and selectable (> 1 mm)
Number of anode-cathode compartments	Selectable
Electrodes material	BDD / IrO_2 / Pt / PbO_2 / RuO_2 / Stainless steel / SnO_2 / Ti
Reactor material	Borosilicate / Methacrylate / PP / Quartz / Stainless steel
Sealing gaskets material	EPDM / TPU / Viton®
Connection type	Barb fitting / Quick plug
Optional features	Automatization / Online measurements (pH, O_2, etc.) / Jacketed reactor / Mirror finish / System for the recovery of the photocatalyst / Temperature control

References of equipment: photoelectrochemical



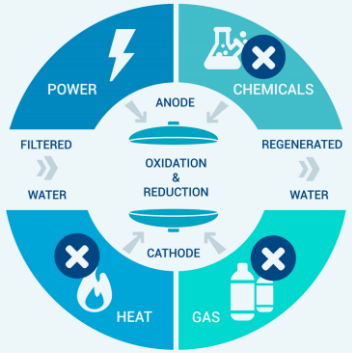
PElab LED365-3p/S-N25



PElab LED365-16c/T-S430

Introduction

ELOXIRAS® is an innovative process for the treatment and reuse of marine and brackish water, developed to enhance the productivity and to reduce the environmental impact of recirculating aquaculture systems (RAS).



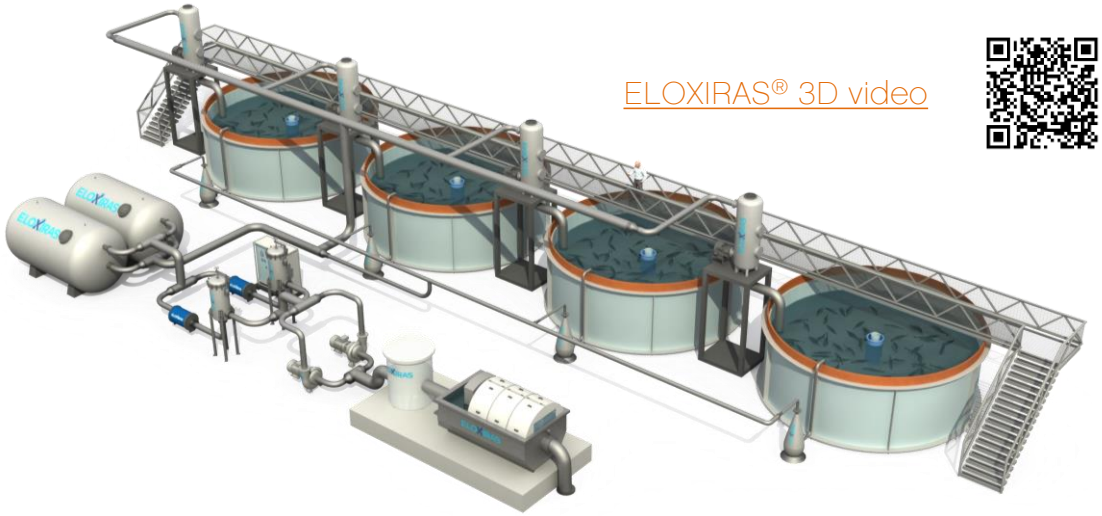
Based on the electrochemical oxidation technology, it only requires an electrical potential between two electrodes in water.

POLLUTANT	CONVENTIONAL TREATMENTS	ELOXIRAS®
TAN	Moderate	Excellent
Nitrite	Moderate	High
Organic matter	Low	High
Pathogens	No removal	Excellent

High removal rates of contaminants are achieved, such as total ammonia nitrogen (TAN), nitrite, and dissolved organic matter, together with high disinfectant efficacy.

Stages of the treatment

1. **Pre-treatment** by filtration of the water.
2. **Main treatment** by means of electrooxidation reactors for the removal of ammonia, nitrite, organic matter, and pathogens.
3. **Post-treatment** for the elimination of oxidation by-products and the balance of gases.



ELOXIRAS® 3D video

Available models

ELOXIRAS® is commercialized in several standardized models, based on its market application, its treatment capacity, and its functionalities, thus, offering the clients the possibility of make up a customized product adapted to the specific needs of their RAS system.

ELOXIRAS® (1)-(2)-(3)

1. **Market applications**
   MINI, HYBRID, LOGISTIC, and BIO.
2. **Treatment capacity**
   30, 150, 300, 600, 1500, 3000, etc.
3. **Functionalities**
   Concept, Basic, Comfort, and 4.0.

References of equipment

ELOXIRAS® MINI-300-4.0

ELOXIRAS® MINI-600-4.0

Introduction

Our know how in the area of chemical engineering allows us to act as a technological supplier of other equipment, such as microbial fuel cells, bioreactors or test benches. For tailored equipment do not hesitate to consult us.

References of equipment

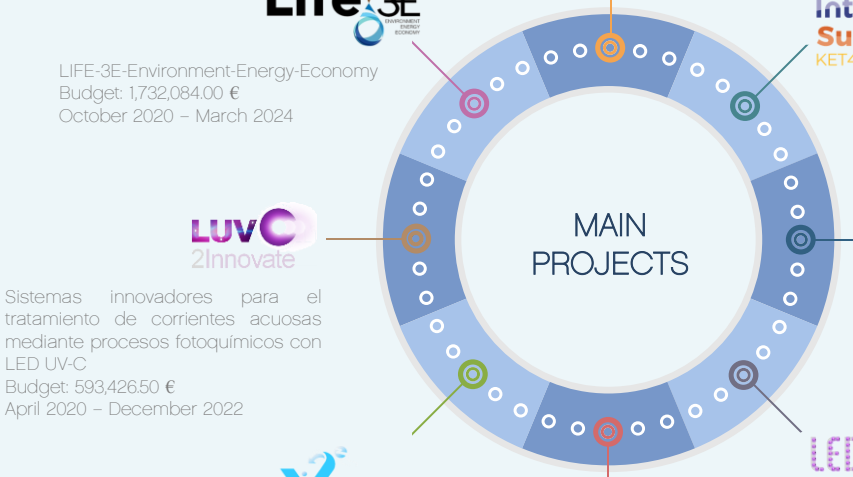
MFClab S-S400

MFCbench T-T5000

Multipump test plant.

R&D ACTIONS

For our team, each client is special and requires specific and customized solutions always based on the latest technology, which we contribute to develop and transfer to the market with a continuous effort in R&D.



LIFE2 acid

Towards a sustainable use of metallic resources in the galvanic industry
Budget: 1,231,501.51 €
July 2017 – December 2020

Life 3E

LIFE-3E-Environment-Energy-Economy
Budget: 1,732,084.00 €
October 2020 – March 2024

Interreg Sudoe
KET4F-Gas

Environmental impact reduction of fluorinated gases at the Sudoe Region through key enable technologies
Budget: 1,742,800.00 €
April 2018 – March 2021

LUVC 2Innovate

Sistemas innovadores para el tratamiento de corrientes acuosas mediante procesos fotoquímicos con LED UV-C
Budget: 593,426.50 €
April 2020 – December 2022

ImpulRAS

Hacia una mejora tecno-económica de ELOXIRAS® control y minimización de subproductos
Budget: 486,769.00 €
July 2018 – December 2020

ELOXIRAS® dulce

Oxidación Electroquímica en sistemas de acuicultura de agua dulce en recirculación
Budget: 97,062.00 €
January 2020 – March 2021

LED4Future

Nueva generación de reactores fotocatalíticos UV-LED para la eliminación de compuestos persistentes en aguas
Budget: 137,501.00 €
January 2019 – March 2020

DSWAP

Decision support-based approach for sustainable water reuse application in agricultural production
Budget: 2,000,373.75 €
July 2019 – July 2022

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