Aeration Unit

PEAI

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⤷PRODUCTS
  ⤷12.-FOOD & WATER
    TECHNOLOGIES
    AND
  13.-ENVIRONMENT

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION
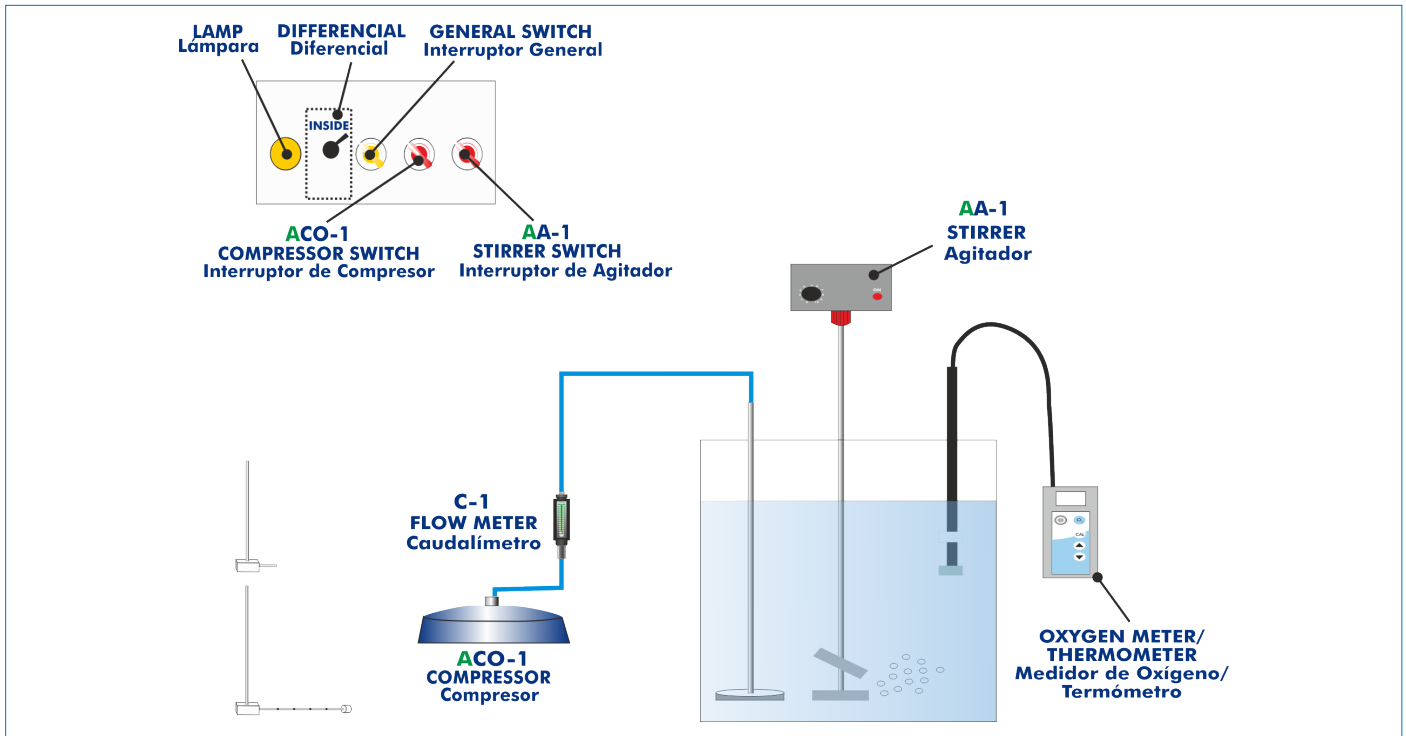
LAMP
Lámpara

DIFFERENCIAL
Diferencial

GENERAL SWITCH
Interruptor General

INSIDE

ACO-1
COMPRESSOR SWITCH
Interruptor de Compresor

AA-1
STIRRER SWITCH
Interruptor de Agitador

AA-1
STIRRER
Agitador

C-1
FLOW METER
Caudalímetro

ACO-1
COMPRESSOR
Compresor

OXYGEN METER/
THERMOMETER
Medidor de Oxígeno/
Termómetro

INTRODUCTION

In its broadest sense, aeration is the process by which the contact area between water and air is increased, either by natural means or mechanical devices. However, the common use in water work has given the term a more limited character, referring specifically to the use of mechanical devices. In this sense, aeration is defined as a method of treatment rather than the mere modification of the natural conditions of the water at the source of supply.

Oxygen transfer by aeration is a unitary operation that plays a major role in the biological processes of wastewater treatment. In water treatment plants the highest energy consumption is associated with the aeration system of the biological treatment. This makes studies related to aeration systems to improve their efficiency important, since they can contribute to a notable decrease in the energy costs of the treatment plant.

The Aeration Unit, "PEAI", designed by EDIBON, is a demonstration equipment of the water aeration process to mainly eliminate odors and tastes from the water. It allows the study of the oxygen transfer characteristics by means of different air diffusion systems, as well as the study of the mixing process.

GENERAL DESCRIPTION

The Aeration Unit, "PEAI", allows the study of the oxygen transfer characteristics of diffused air systems and the physical and chemical parameters which influence oxygenation capacity and demonstrates the water aeration process which, mainly, eliminates smell and taste from water.

The "PEAI" unit also allows the study of the mixing and agitation processes in order to familiarize the student with the different types of agitators.

The main component of the unit is the central tank where the liquid subjected to study will be poured. An air pump, located underneath the tank, injects air in the tank. The air-injection tube passes previously traverses a device that measures and control the injected air, allowing the control of the volume of air that is allowed into the tank. After the air flow controller, the air is led through a flexible tube to the upper inlet of the tank. There, three different air outlets can be connected, in order to disperse the air in different ways (three type of diffusers are supplied).

On the other hand, there is a stirrer, with variable speed control, in the middle of the tank. The main part of the stirrer is a motor that makes it turn inside the tank. The unit includes different types of agitators of different size.

There is an oxygen meter to measure the oxygen dissolved in the water and a temperature meter.

The tank is made of a transparent material to facilitate the observation of the mixing process. There covers to avoid splashes.

SPECIFICATIONS

Bench-top unit.

Anodized aluminum frame and panels made of painted steel.

Main metallic elements made of stainless steel.

Diagram in the front panel with distribution of the elements similar to the real one.

Unit to study in the stirred tank for mixing and gas exchange.

Open tank, capacity: 28 l.

Stirrer with variable speed control.

Agitators: They are the elements in charge of the agitation of the fluid, and they can be of different shapes and sizes:

    Two blades agitators, diameters: 100 mm and 50 mm.

    Two propeller agitators, diameters: 100 mm and 50 mm.

    Two turbine agitators, diameters: 100 mm and 50 mm.

The propeller agitators are used for mixing with viscosity higher than 2000 cp.

Air pump.

Airflow meter, range: 0.4 – 5 l/min.

Three type of diffusers to sparge a gas: sparger tube, disk airstone and single airstone.

Oxygen meter, range: 0.0 – 60 mg/l. Oxygen probe length: 300 mm.

Temperature meter, to obtain the tank temperature, range: -19.9 – 149.9 °C (0.1 °C).

Control panel:

    Lamp.
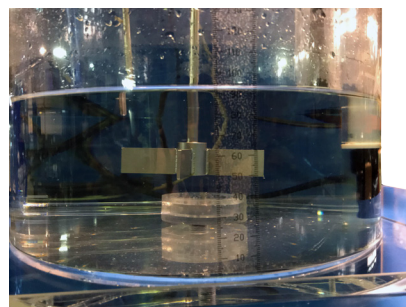
    Automatic differential.

    General switch.

    Compressor switch.

    Stirrer switch.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

PEAI detail

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Determination of the aeration needs.

2.- Influence of the injected oxygen volume.

3.- Influence of the stirrer turning speed.

4.- Aeration with air injection and agitation.

5.- Influence of the temperature in the process.

6.- Influence of liquid level in the tank.

7.- Influence of the water composition.

Additional practical possibilities:

8.- Measurement of the absorption coefficient K and the S oxygenation capacity R.

9.- Effects of oxygen transfer under non-steady state conditions.

REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.
- Water supply and drain.

DIMENSIONS AND WEIGHTS

PEAI:
-Dimensions: 600 x 700 x 850 mm approx.
(23.62 x 27.55 x 33.46 inches approx.)
-Weight: 50 Kg approx.
(110 pounds approx.)

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- Stop clock.

- Triple beam top loading balance.

- 100 ml measuring cylinder.

RECOMMENDED CONSUMABLES (Not included)

- Sodium sulphite.

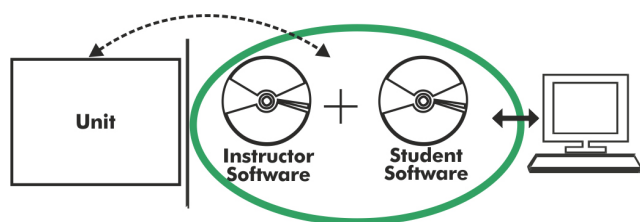- Cobaltous chloride.

SIMILAR UNITS AVAILABLE

Offered in this catalog:

- PEAI. Aeration Unit.

Offered in other catalog:

- PEAIC. Computer Controlled Aeration Unit.

PEAI/ICAI. Interactive Computer Aided Instruction Software:

With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF).** Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.
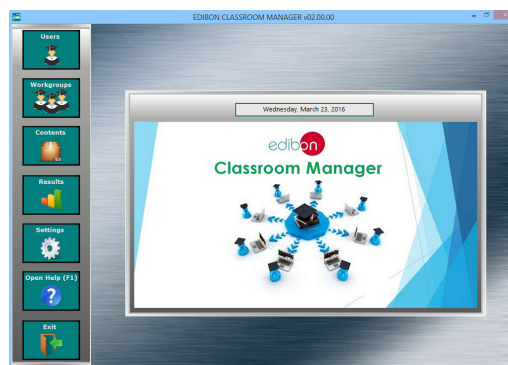
Instructor Software

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).

ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

• User Data Base Management.

• Administration and assignment of Workgroup, Task and Training sessions.

• Creation and Integration of Practical Exercises and Multimedia Resources.

• Custom Design of Evaluation Methods.

• Creation and assignment of Formulas & Equations.

• Equation System Solver Engine.

• Updatable Contents.

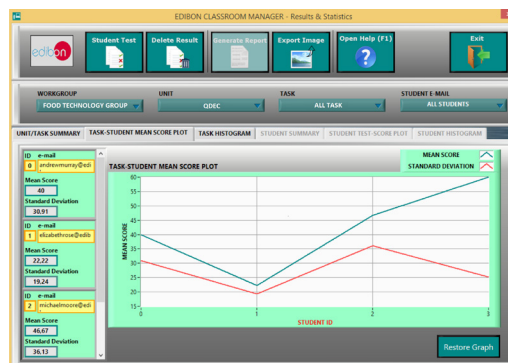• Report generation, User Progression Monitoring and Statistics.

ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen
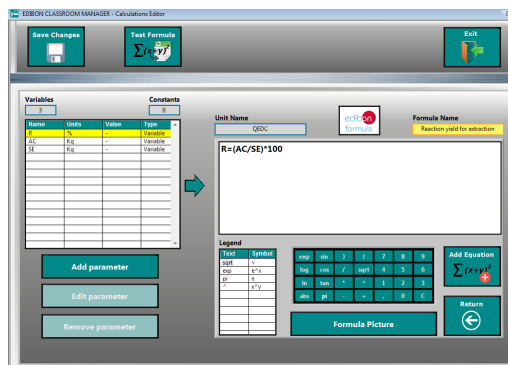
ECAL. EDIBON Calculations Program Package - Formula Editor Screen
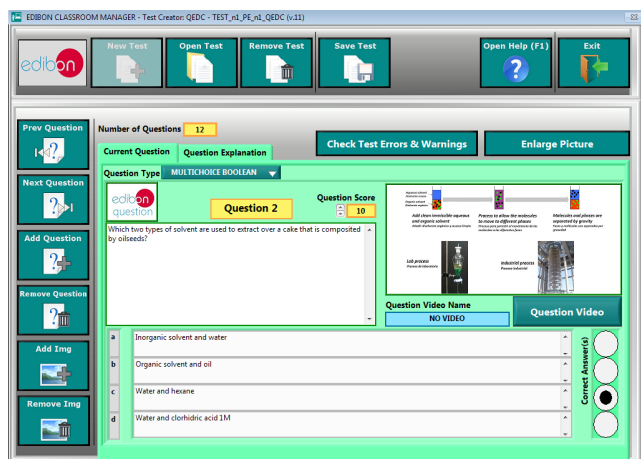
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

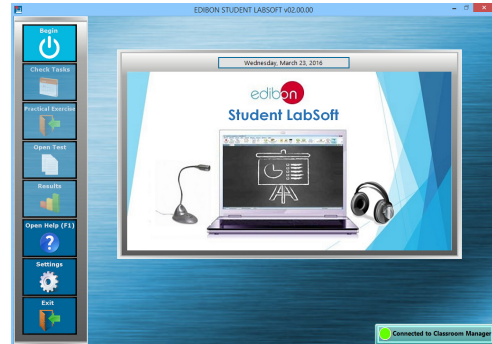## - ESL-SOF. EDIBON Student Labsoft (Student Software).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

• **Student Log-In & Self-Registration.**

• **Existing Tasks checking & Monitoring.**

• **Default contents & scheduled tasks available to be used from the first session.**

• **Practical Exercises accomplishment by following the Manual provided by EDIBON.**

• **Evaluation Methods to prove your knowledge and progression.**

• **Test self-correction.**

• **Calculations computing and plotting.**

• **Equation System Solver Engine.**

• **User Monitoring Learning & Printable Reports.**

• **Multimedia-Supported auxiliary resources.**

ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen

For more information see **ICAI** catalogue. Click on the following link:

www.edibon.com/en/files/expansion/ICAI/catalog
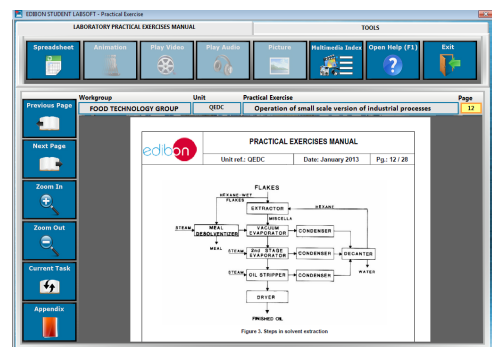
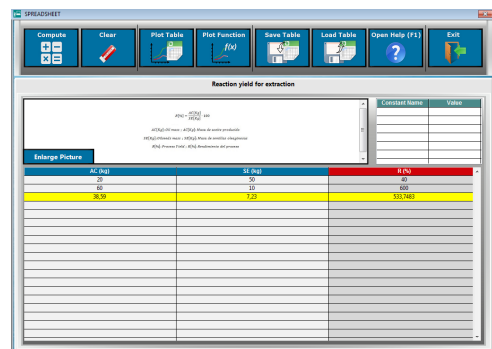EPE. EDIBON Practical Exercise Program Package Main Screen
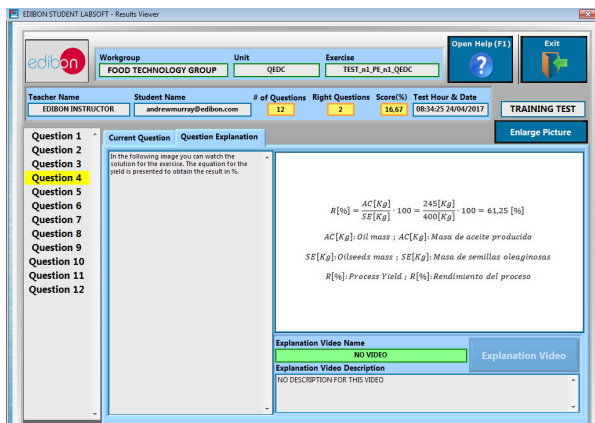
ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

✱ Specifications subject to change without previous notice, due to the convenience of improvement of the product.

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REPRESENTATIVE: