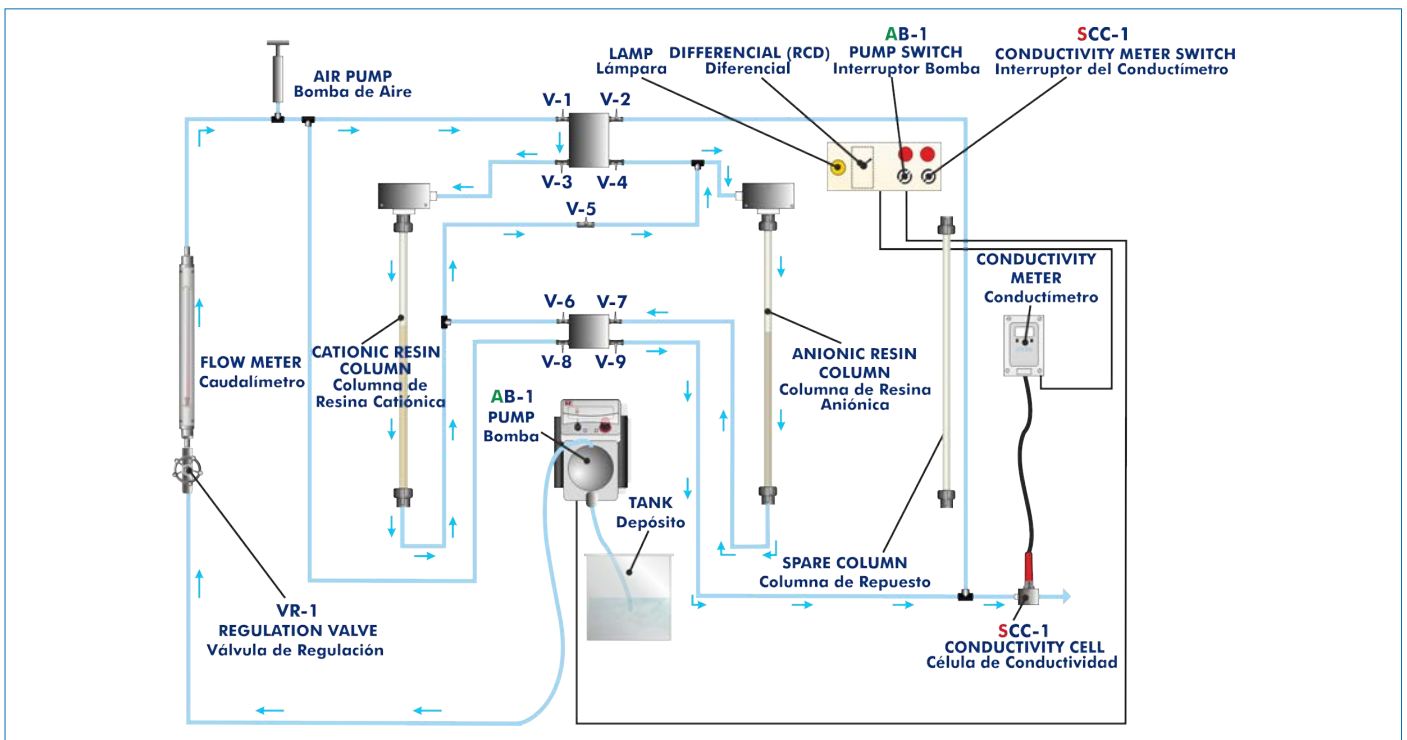




PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



Certificate and Worlddidac Member

INTRODUCTION

The ionic exchange is a “reversible chemical generated when an ion from a solution is exchanged by other ion with the same sign, which is combined with other immobile solid particle”. This process is usually produced in the inorganic and organic matter in nature.

Water has many impurities and pollutants, due to its properties as a solvent and its utilisation in many industrial processes. Mineral salts are dissolved in the water, breaking down into ions. Its existence is not desirable for the normal uses of the water. Also, the increasing interest for the environment imposes the establishment of efficient treatments in order to avoid the deterioration of the water quality specially due to the spilling of many pollutants such as industrial products. The ionic exchange is an option to consider among all possible treatments.

The Ion Exchange Unit, "EII", has been designed to study water softening in a single bed or water demineralization in a double bed system.

GENERAL DESCRIPTION

The Ion Exchange Unit, "EII", is a self-contained unit composed by a panel, where two transparent columns are situated in order to put anionic and cationic resins, and also a spare column and a pump, which supplies the efficient from the tanks attached to the pipes, forming several circuits according to the process: softening, demineralization or regeneration.

The flow of the pump can be regulated and can be read in a flowmeter before the inlet of the first ion exchanger.

A conductivity meter connected to the outlet of the unit allows the students to measure the process and a useful and easy checking of the ionic exchange evolution.

The unit includes the most usual resins used in the process of softening water (styrene sulfonate, in its sodium form), which have a strong affinity with calcium and magnesium ions. When these have been eliminated, the solution also eliminates or retains the ferrous ion.

The diaphragm pump facilitates the circulation of water along the different circuits of the unit: flow through an anionic column, flow through a cationic column and successive flow through anionic and cationic column.

The unit allows for exchanging different materials, the resins and reagents employed, as well as the problem water.

SPECIFICATIONS

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.

Two transparent vertical columns for the anionic and cationic resins, volume: 0.16 l.

One spare column.

Four tanks made of PMMA (treated water, demineralized water, hydrochloric acid and sodium hydroxide).

Diaphragm pump. Maximum flow: 5 l/h. Maximum height: 70 m.

Hydrochloric acid resistant flow meter. Range: 0 - 10 l/h.

Valves and pipes circuit.

Conductivity meter (with conductivity cell):

Scale: 0 - 10 mS.

Operating temperature: 0 - 50 °C.

Accuracy +/-2 %.

Typical commercial anionic and cationic resins.

Control board.

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.



EII detail

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Study of ion exchange general techniques.
- 2.- Familiarization with the operation modes of ion exchange in columns.
- 3.- Exchange capacities of different resins.
- 4.- Analysis of the water softening process with cationic resin.
- 5.- Analysis of the demineralization process.
- 6.- Demineralization with double bed exchange.
- 7.- Regeneration efficiency of a cationic and an amionic resin.
- 8.- Study of the operation of a conductivity meter.
- 9.- Regeneration efficiency of a water softening system.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V/50Hz or 110V/60Hz.
- Water supply to fill the tanks.

DIMENSIONS AND WEIGHTS

- ElI:
- Dimensions: 1200 x 500 x 1000 mm approx.
(47.24 x 19.68 x 39.37 inches approx.)
 - Weight: 50 Kg approx.
(110.2 pounds approx.)

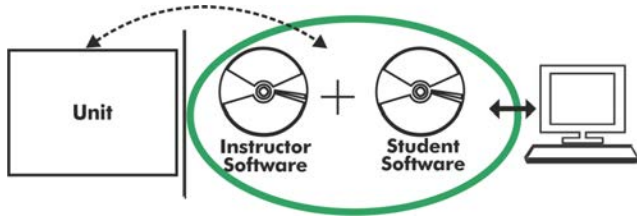
RECOMMENDED ACCESSORIES (Not included)

- Chemical products: hydrochloric acid, sodium hydroxide, sodium chloride.
- Deionized water.
- Chronometer.

RECOMMENDED CONSUMABLES (Not included)

- | | | |
|---|--|---|
| • Calcium acetate (CaAc_2). | • Ammonia (solution) (NH_3). | • Ammonium chloride (NH_4Cl). |
| • Hydrochloric acid (HCl). | • Sodium Chloride (NaCl). | • Deionized water. |
| • Methylene (CH_4). | • Silver nitrate (AgNO_3). | • Bromopyrogallol red, indicator ($\text{C}_{19}\text{H}_{10}\text{Br}_2\text{O}_8\text{S}$). |
| • Sodium acetate (CH_3COONa). | • Trietanolamine ($\text{C}_6\text{H}_{15}\text{NO}_3$). | • Eriochrome T, black indicator ($\text{C}_{20}\text{H}_{13}\text{N}_2\text{NaO}_5\text{S}$). |
| • Calcium Chloride (CaCl_2). | • Calcium carbonate (CaCO_3). | • Murexide, indicator ($\text{C}_8\text{H}_8\text{N}_6\text{O}_6$). |
| • Copper sulphate (CuO_4S). | • EDTA patron ($\text{C}_{10}\text{H}_{16}\text{N}_2\text{O}_8$). | |
| • Nickel chloride (NiCl_2). | • Phenolphthalein, indicator ($\text{C}_{20}\text{H}_{14}\text{O}_4$). | |
| • Barium Chloride (BaCl_2). | • Methyl orange, indicator ($\text{C}_{14}\text{H}_{14}\text{N}_3\text{NaO}_3\text{S}$). | |
| • Magnesium sulphate (MgSO_4). | • Ethanol ($\text{C}_2\text{H}_6\text{O}$). | |
| • Sodium hydroxide (NaOH). | • Ammonium hydroxide (NH_4OH). | |

EII/ICAI. Interactive Computer Aided Instruction Software System:



With no physical connection between unit and computer (PC), 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.

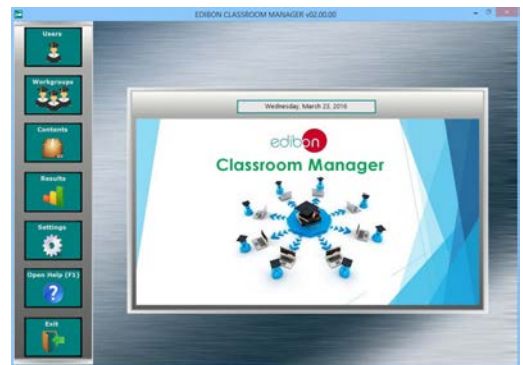
Instructor Software

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

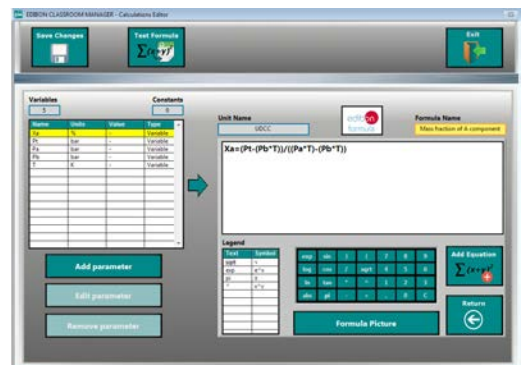
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

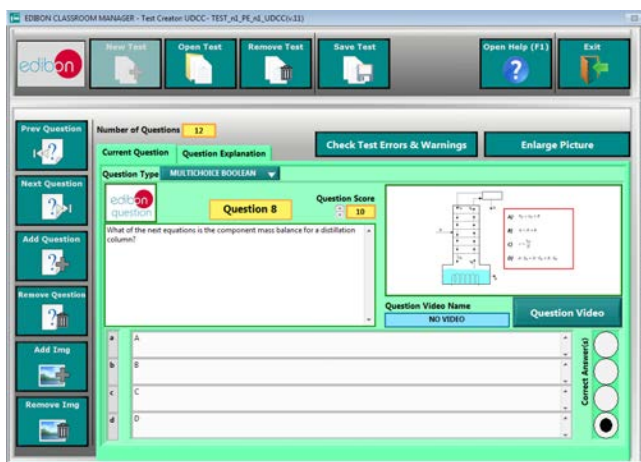
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- 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

Optional
Student Software

- 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.

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

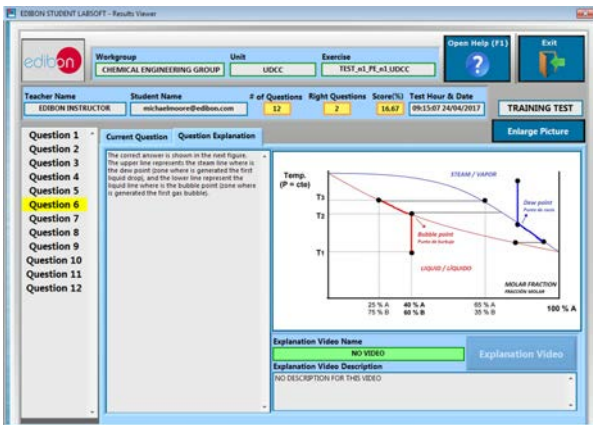
www.edibon.com/en/files/expansion/ICAI/catalog



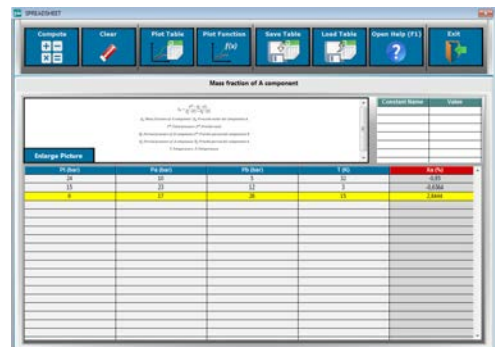
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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.



C/ Del Agua, 14. Polígono Industrial San José de Valderas.
28918 LEGANÉS. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363 Fax: 34-91-6198647
E-mail: edibon@edibon.com Web: www.edibon.com

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REPRESENTATIVE:

