Solid-Liquid Extraction Unit

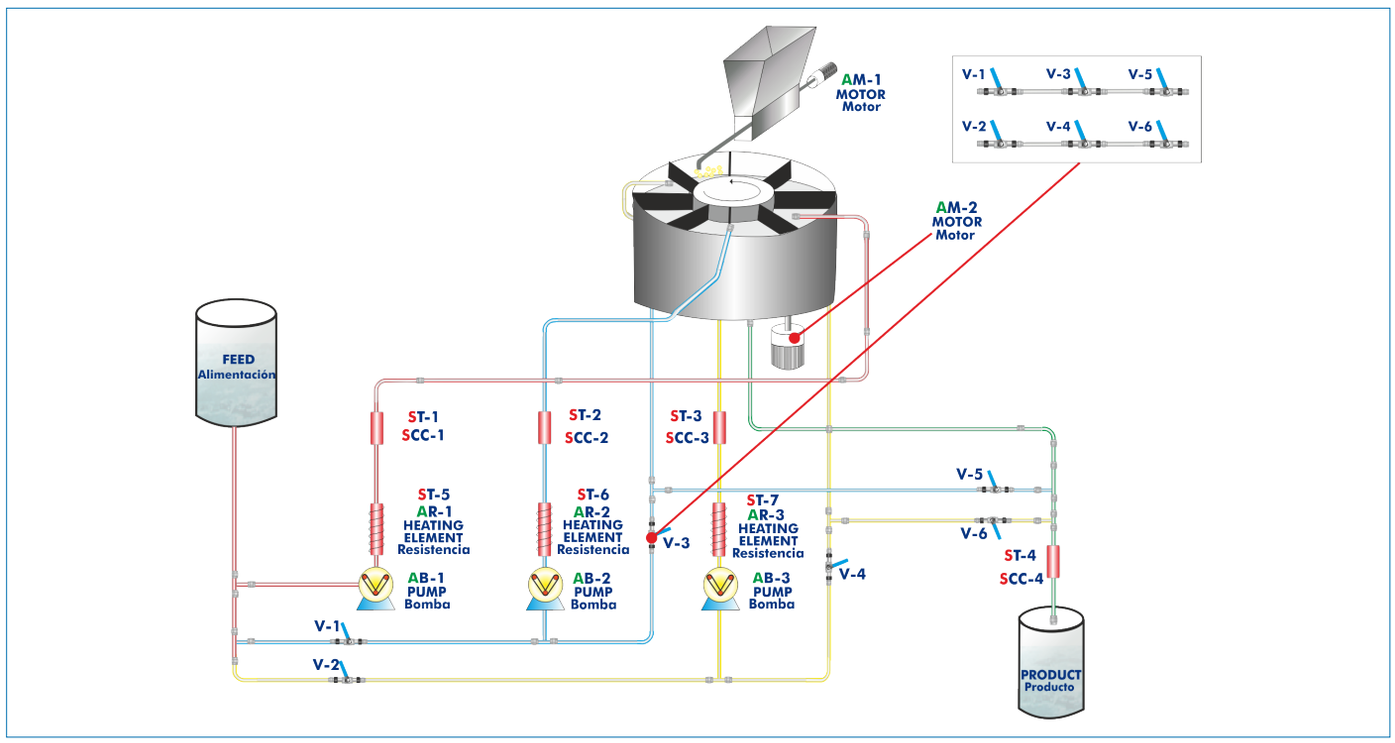
UESLB

Engineering and Technical Teaching Equipment

www.edibon.com
PRODUCTS
11.-CHEMICAL ENGINEERING

Electronic console

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)

"Worlddidac Quality Charter" and Platinum Member of Worlddidac

INTRODUCTION

The extraction is a basic operation of mass transfer based on the dissolution of one or some components of a mixture, liquid or part of a solid, through a suitable solvent. In the liquid-liquid extraction, the mass to be extracted is in a liquid, and in the solid-liquid extraction is in a solid.

The way of performing the extraction will depend on the proportion of the component to be extracted, on the distribution of this component in the solid, on the nature of the solid and on the of particle size.

The Solid-Liquid Extraction Unit, "UELSB", allows a continuous solid-liquid process of extraction in countercurrent which is the most commonly used in industry because it is the one with the highest efficiency.

GENERAL DESCRIPTION

The Solid-Liquid Extraction Unit, "UESLB", is a laboratory-scale unit designed to study the separation of a soluble element from a solid in a continuous feed, multistage and countercurrent way, with the help of a solvent.

The unit utilises a continuous feed, counter current flow, multiple stage (but may also configured as one or two stage process for teaching purposes), rotary extractor system of the type frequently seen in industrial applications. The effects of temperature, multiple stages, and throughput rate can all be investigated.

The design of the unit is based on the continuous rotation extraction cell used in industrial scale, which is called 'Rotocel'. This is the main part of the solid/liquid extraction system and it is divided into compartments. The raw material is fed into these compartments from the input hopper. The material is then passed under three solvent sprinklers, and the dissolved product captured in three drainage compartments. Pumps are provided to pump the product from the drainage compartment of one stage to the sprinkler of the next stage. At the end of the process the spent carrier material will go to a collection container.

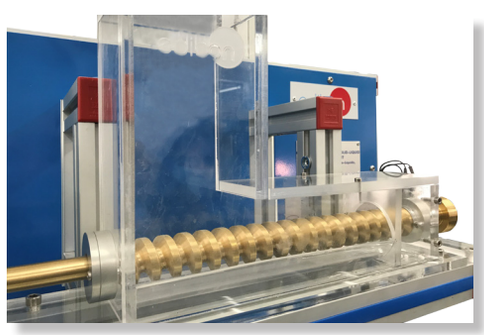
The solid carrier can be a light porous material. It can be impregnated with a salt such as sodium bicarbonate or potassium bicarbonate, which is then extracted by the process.

SPECIFICATIONS

Anodized aluminum frame and panels made of painted steel.
The unit includes wheels to facilitate its mobility.
Main metallic elements made of stainless steel.
Diagram in the front panel with distribution of the elements similar to the real one.
Feed liquid vessel, capacity: 9 l.
Product liquid vessel, capacity: 9 l.
Feed hopper with feed endless screw for solids.
Motor for feed endless screw.
Main rotary extraction vessel with eight cells of extraction.
Motor for the rotation of the main extraction vessel.
Variable rotation speed.
Three sprinklers.
Solid products exit.
Conductivity meter, and four conductivity cells:
- Three conductivity scales:
  - 200 μS $\rightarrow$ 0.1 – 199.9 μS.
  - 2 mS $\rightarrow$ 0.2 – 1.999 mS.
  - 20 mS $\rightarrow$ 2 – 19.99 mS.
  - * μS: microSiemens; mS: miliSiemens.

Four temperature sensors, "J" type.
Three heating resistances, range: 360 W each one.
Three safety thermostats: 70 °C.
Three peristaltic pumps, with speed regulator: 12.7 l/h.
Three decanting filters (in-line strainer).
Circulation valves to change the circuit configuration.
Solvent temperatures: ambient to 50 °C.
Electronic console:
- Temperature sensors connections.
- Digital display for temperature sensors.
- Selector for temperature sensors.
- Three controllers for the three heating elements.
- Pumps speed controller.
- Touch screen for controlling:
  - Number of revolutions of the feed motor.
  - Number of cycles.
  - Cycle time.
- Main 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.



UESLB detail

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Demonstration of the operation of a continuous multiple stage process.
2.- Closed circuit percolation extraction (batch operation).
3.- Open loop percolation extraction (continuous operation).
4.- Investigation of one, two and three stage continuous processes.
5.- Investigation into effect of solvent temperatures.
6.- Investigation into effect of solvent flow rates.
7 .- Investigation into effect of processing time.
8.- Process economics. Process efficiency.
9.- Mass balances.
10.-Influence of the particle size.
11.-Influence of the stages numbers.
12.-Influence of the solvent type.
13.-Extractions of inorganic and aqueous components.
14.-Test of extractions for industrial use.

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

UESLB:
Unit:
-Dimensions: 705 x 570 x 1680 mm approx.
(27.75 x 22.44 x 66.14 inches approx.)
-Weight: 100 Kg approx.
(220 pounds approx.).
Electronic console:
-Dimensions: 490 x 330 x 310 mm approx.
(19.29 x 12.99 x 12.20 inches approx.)
-Weight: 10 Kg approx.
(22 pounds approx.).

REQUIRED CONSUMABLES (Not included)

- Reactant: Sodium bicarbonate.

SIMILAR UNITS AVAILABLE

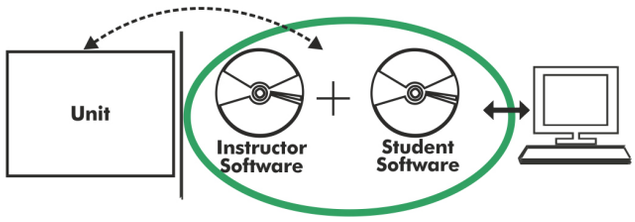
Offered in this catalog:

- UESLB. Solid-Liquid Extraction Unit.

Offered in other catalog:

- UESLC. Computer Controlled Solid-Liquid Extraction Unit.

UESLB/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.

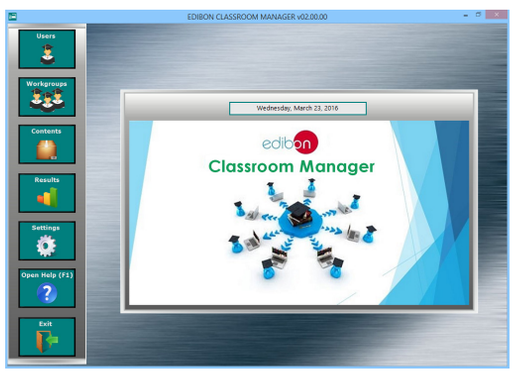
Instructor Software

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

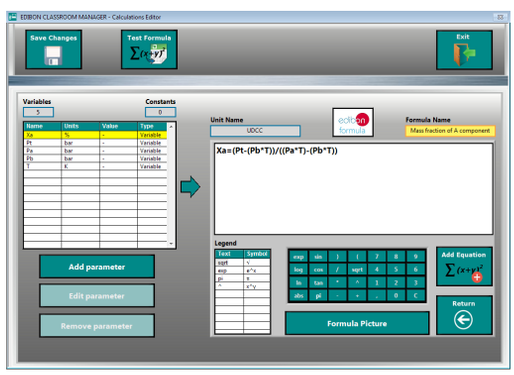
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

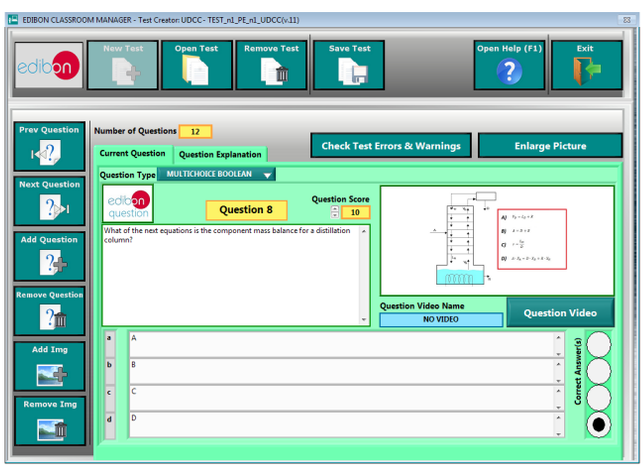
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



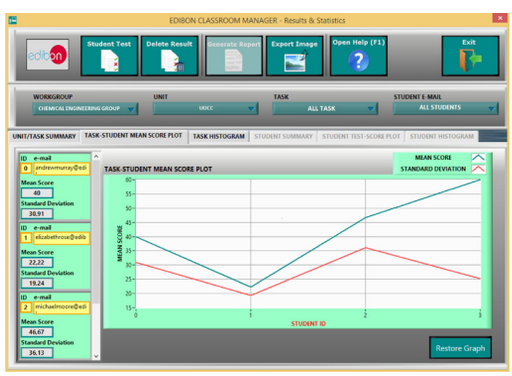
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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

Optional

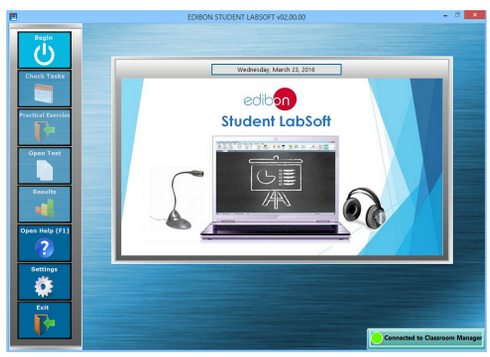
Student Software

- 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:

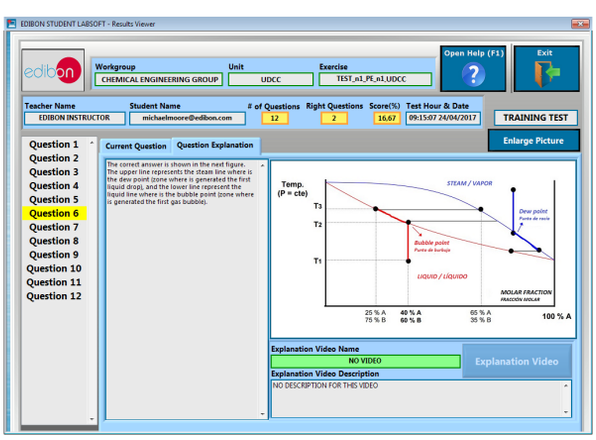
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge and progression.**
- **Test self-correction.**
- **Calculations computing and plotting.**
- **Equation System Solver Engine.**
- **User Monitoring Learning & Printable Reports.**
- **Multimedia-Supported auxiliary resources.**



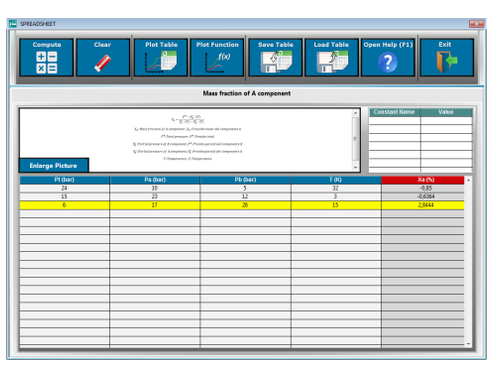
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

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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