edibon

Engineering and Technical
Teaching Equipment

QUCB

Electronic console

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION
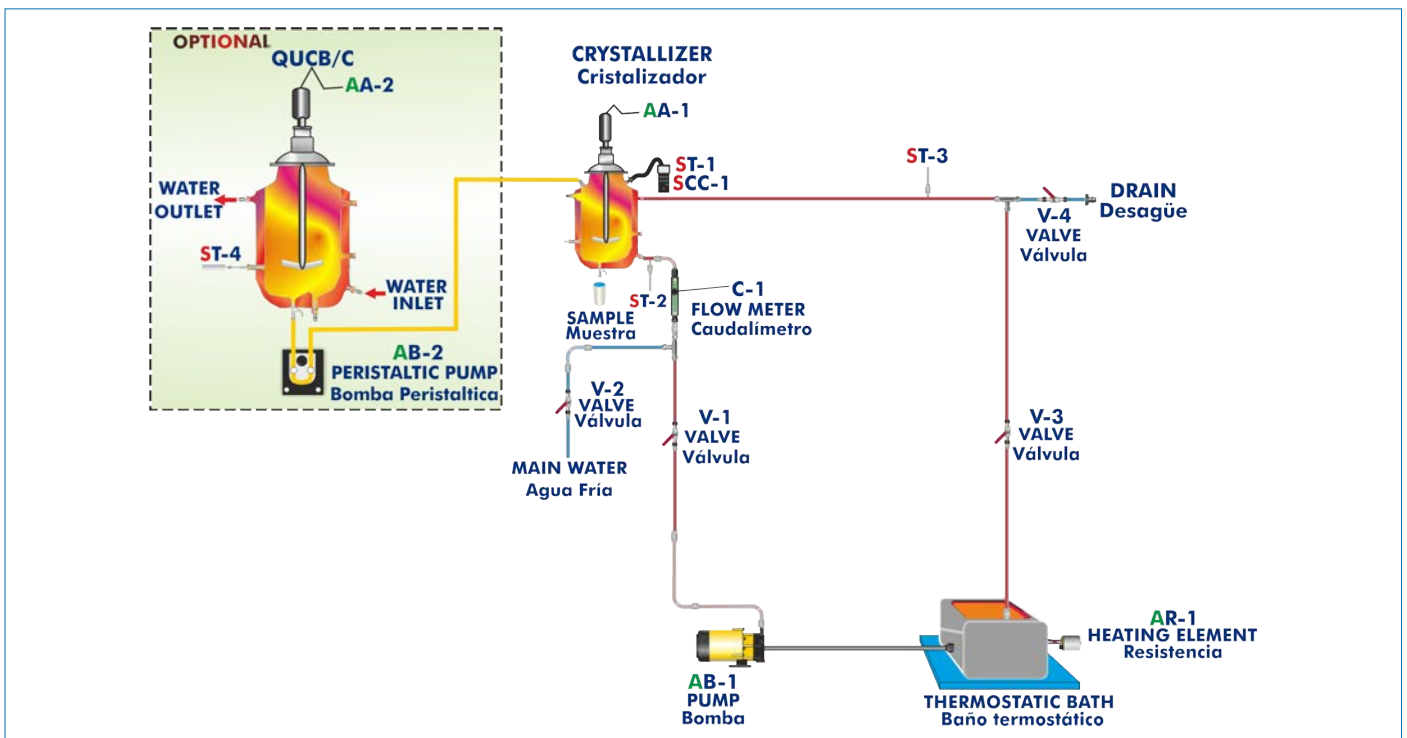
OPTIONAL

QUCB/C
AA-2

WATER
OUTLET

ST-4

WATER
INLET

AB-2
PERISTALTIC PUMP
Bomba Peristaltica

CRYSTALLIZER
Cristalizador

AA-1

ST-1
SCC-1

ST-3

DRAIN
Desagüe
V-4
VALVE
Válvula

ST-2
SAMPLE
Muestra

C-1
FLOW METER
Caudalímetro

V-2
VALVE
Válvula

V-1
VALVE
Válvula

V-3
VALVE
Válvula

MAIN WATER
Agua Fría

AR-1
HEATING ELEMENT
Resistencia

AB-1
PUMP
Bomba

THERMOSTATIC BATH
Baño termostático

INTRODUCTION

Crystallization is a method generally used for purifying substances, so that the constituents of a solution can be separated.

A solution must reach a supersaturated condition in order to crystallize its solute. To saturate a solution, a product, called solute, is dissolved in it to such a degree that the solution is unable to dissolve more solute.

There are several methods used to obtain a supersaturated solution:

By evaporation.

By cooling.

By adding aggregates.

The Crystallization Unit, "QUCB", developed by EDIBON, is a cooling crystallization unit. Therefore, it is suitable to perform crystallization experiments with those constituents whose solubility changes according to the temperature.

One of the main advantages of the cooling method is its low energy costs.

A crystallizer is a reactor where a crystallization process takes place. A crystallizer can be batch or continuous operated.

GENERAL DESCRIPTION

The Crystallization Unit, "QUCB", is a unit for the study of the cooling crystallization process. EDIBON has developed this unit to study the crystallization reaction of those constituents whose solubility changes with the temperature.

This unit is devised to perform batch crystallization, that is, the crystallizer is filled once with the solute and solvent until the supersaturated solution is obtained and crystals are obtained from that solution.

The "QUCB" unit includes a crystallizer, which is basically a jacketed chemical reactor. There is a bath outside the crystallizer, through which the reaction temperature is controlled. The solution is stirred by a stirrer located at the upper side of the crystallizer. Besides, there is a temperature sensor at the upper side of the crystallizer to know the temperature of the solution inside at any moment.

The unit also includes a conductivity sensor to know the conductivity of the solution when it is required.

To obtain the supersaturated solution, it must be heated so that it is able to dissolve a higher concentration of solute at high temperatures. There is a thermostatic bath to supply water to the crystallizer's jacket. Its control is done by means of a potentiometer.

Once a supersaturated solution at a high temperature is obtained, the crystallization stage starts. For that purpose introduce cold or room temperature water. The unit includes a pressure regulation valve kept to the minimum pressure.

A sample of the collected product is analyzed with the filters set provided with the unit. The size of generated crystals can be obtained thus.

With the additional recommended element Continuous Feed Unit, "QUCB/C", this unit becomes a continuous crystallization unit.

SPECIFICATIONS

Bench-top unit with adjustable legs.

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.

Crystallizer composed of jacketed reactor made in glass (1 litre of capacity), which includes temperature sensors and stirrer. Batch operation.

Double blade stirrer.

The crystallization reactor is thermally controlled by means of heated water circulating in the reactor jacket.

Thermostatic bath of 600 W, with feed water impulsion pump.

Water flowmeter, rotameter type, rage:0 – 2 l/min.

Four two-way valves to allow the water circulation, according to the process.

Three temperature sensors, "J" type, located at key points of the system.

Pressure regulation valve to protect the system, range: 0.5 – 6 bar.

Conductivity meter to measure the solution conductivity, range: to 2000 mS.

Set of sieves, composed of:

Three sieves of different light size: 0.5 mm/1 mm/2 mm

Vessel to collect the crystals, capacity: 2 l.

Protection devices for the electric circuits.

Electronic console:

Metallic box.

Temperature sensors connections.

Selector for temperature sensors.

Digital display for surpervising the temperature and the conductivity.

Pump switch.

Stirred switch.

Thermostatic bath controller.

Magnetothermal protection switch.

Protection fuses.

Cables and Accessories, for normal operation.

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

Additional recommended elements (Not included):

- QUCB/C. Continuous Feed Unit.

QUCB detail

Additional recommended elements (Not included)

QUCB/C. Continuous Feed Unit

The Continuous Feed Unit, "QUCB/C" is complementary to the "QUCB" unit, which allows to turn the crystallizer into continuous.

It consists of a jacketed reactor where the supersaturated solution is obtained. This reactor, in the upper part, has a stirrer to dissolve the salt, under study, in the solution.

The "QUCB/C" unit has an external thermostatic bath that allow to control the reaction temperature and then to obtain supersaturated solution at high temperatures.

A peristaltic pump supplies the supersaturated solution in a continuous way to the crystallizer.
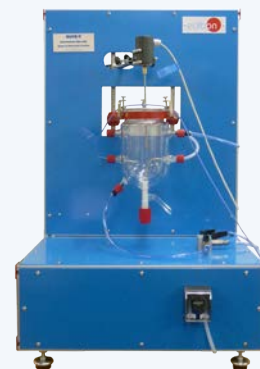
So, the supply of this accessory will allow to compare the batch crystallization and the continuous crystallization.

Specifications:

Jacketed reactor, made in glass.

Double blade stirrer.

Peristaltic pump with variable speed, range: 0 – 30 ml/min.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Understanding the principles of solution cooling crystallization.

2.- Study of crystal size distribution.

3.- Batch operation.

4.- Obtaining crystals by the cooling method.

5.- Demonstration of the effects of varying the following parameters on the crystallization process:

  Concentration of solute.

  Stirring level.

  Cooling temperature.

  Solute supply flow ("QUCB/C is required).

Additional practical possibilities:

6.- Mass and energy balances.

7.- Evaluation of crystallization efficiency and crystallization kinetics.

8.- Operation in continuous ("QUCB/C is required).

REQUIRED SERVICES

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

- Water supply (up to 6 l/min.)

DIMENSIONS AND WEIGHTS

QUCB:

  Unit:

    -Dimensions: 800 x 700 x 1000 mm approx.
    (31.49 x 27.55 x 39.36 inches approx.).

    -Weight: 40 Kg approx.
    (88 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.).

QUCB/C:

    -Dimensions: 600 x 400 x 900 mm approx.
    (23.62 x 15.74 x 35.43 inches approx.).

    -Weight: 25 Kg approx.
    (55.11 pounds approx.).

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- QUCB/C. Continuous Feed Unit.

- Laboratory oven to dry the crystals sample.

- Laboratory balance.

SIMILAR UNITS AVAILABLE

Offered in this catalog:

- QUCB. Crystallization Unit.

Offered in other catalog:

- QUCC. Computer Controlled Crystallization Unit.

- QUCC/A. Computer Controlled Advanced Crystallization Unit.

- QUCB/A. Advanced Crystallization Unit

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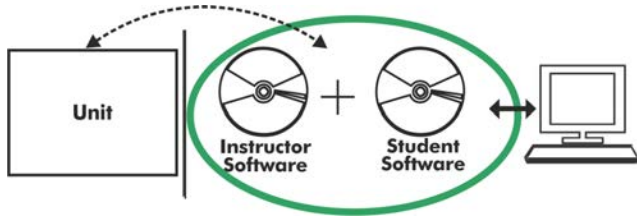
With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF).** Both are interconnected so that the teacher knows at any moment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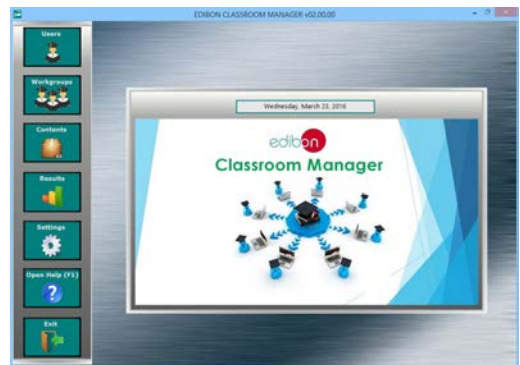
Instructor Software

### - 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
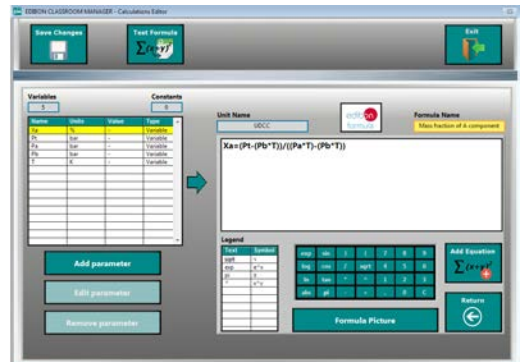
ECAL. EDIBON Calculations Program Package - Formula Editor
Screen
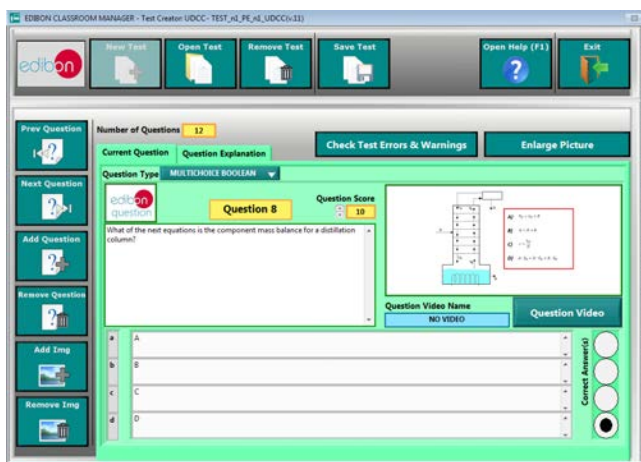
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with
Numeric Result Question

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.

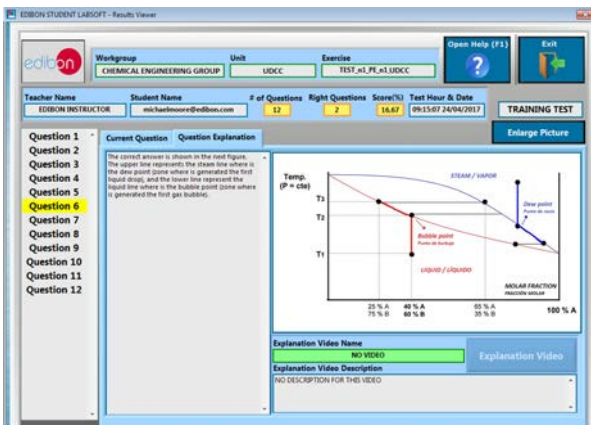For more information see ICAI catalogue. Click on the following link:

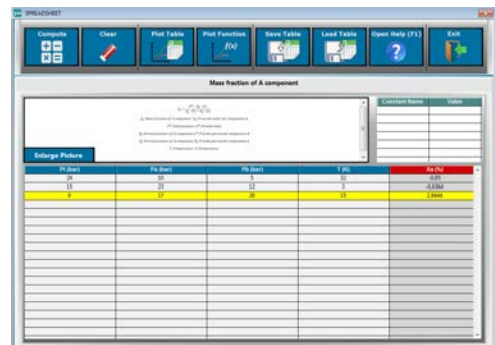www.edibon.com/en/files/expansion/ICAI/catalog

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.

INTERNATIONAL

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Edition: ED01/20
Date: September/2020

REPRESENTATIVE: