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11.-Chemical Engineering

## DESCRIPTION

The "UELL" is an unit, at laboratory scale, designed for studying the separation of liquid mixture by contact with a solvent.

This unit allows to study the extraction of one or several components in a continuous way with a solvent in a theoretical stage. The contact takes place inside a packed column, in which the two phases circulate in countercurrent. The circulation velocity of both phases can be controlled in an independent way. The unit allows the recovery of the solvent, by a rectification process.

This unit consist of the following parts:

The extraction unit consists of a jacketed glass column (packed with 9mm glass Raschig rings), with two enlargement pieces on the ends.

The rectification unit consists of a glass packed column (packed with 3mm glass Raschig rings). It has a boiler, heated by an electric heating mantle and two temperature sensors, one in the boiler and another one in the distillation column head.

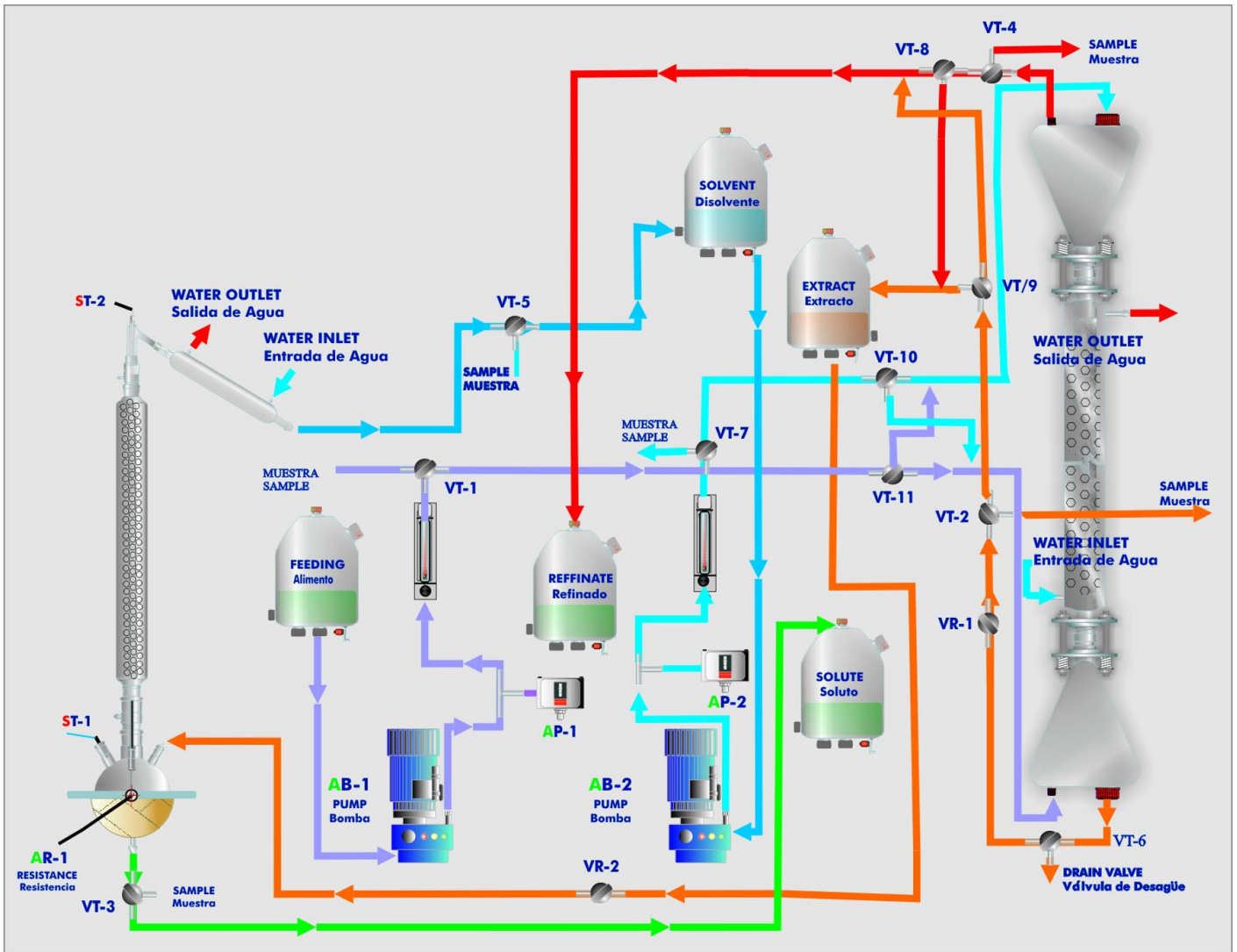
Supply circuits an collection of products connect the different units with the storage tanks.

There are sample takings for control the process in all the lines of fluid.

Dosing pumps.

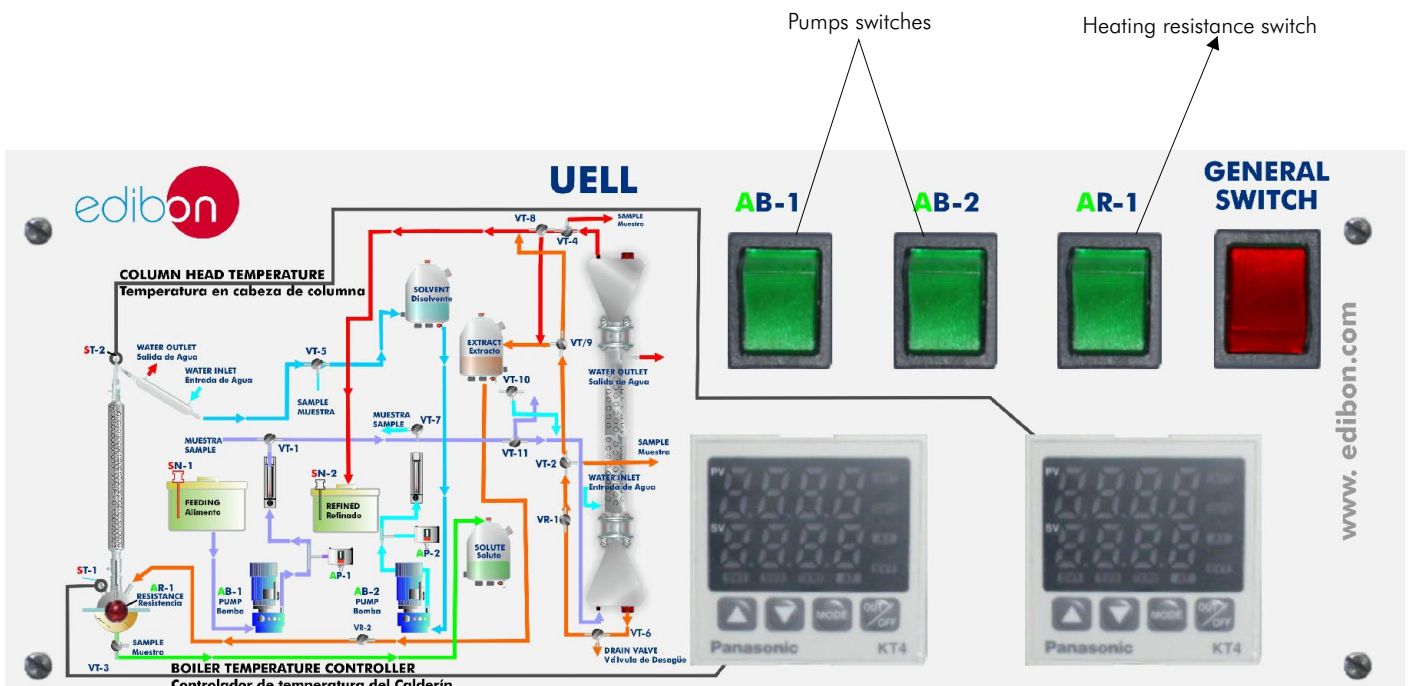
5 Pyrex tanks (feeding, refined, solvent, extract and solute).

The control elements include a valve that adjust the height of the interphase, a regulator- indicator of temperature for the boiler, a temperature sensor in the distillation head, an electrical heating mantle power regulator, two dosing pumps and two rotameters (flow meters) for measuring the flow rate.



Note: ST=Temperature sensor. AP=Pressure switch.

#### Detail of the Electronic Console



## SPECIFICATIONS

Anodized aluminium structure and panels in painted steel (epoxy paint).

Main metallic elements in stainless steel.

Transparent elements for a better observation of the process.

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

Jacketed glass packed column of 1200 mm of longitude and 50 mm of internal diameter, with two enlargement pieces with 2 l. of capacity at the ends, packed with 9 mm glass Raschig rings. In this column the extraction process is carried out.

Jacketed glass packed column of 500 mm of longitude and 25 mm of internal diameter, packed with 3 mm glass Raschig rings. This column is used to the distillation process. Coolant column and elbow.

Boiler with 5 l of capacity for the distillation, heated by an adjustable electric heating mantle, with automatic control of the temperature.

5 Pyrex tanks with 10 l. of capacity for the feeding, the refined, the solvent, the extract and the solute. They have independent casting valves.

Dosing pump with stainless steel head, provides a maximum flow of 50 l/h. and a maximum pressure of 10 bar.

Dosing pump with stainless steel head, provides a maximum flow of 17 l/h. and a maximum pressure of 12.5 bar.

Security devices in the pumps, to avoid shortcomings by overpressure, pressure switches that switch off the pumps when the pressure is high.

Flow meters (rotameters) to measure of feeding and solvent flow. For example: flow meter for acetic acid 4%, range: 0-50 l/h., and flow meter for trichloromethane, range: 0-17 l/h.

2 Temperature sensors (type "J", range: -40 to 750°C) to measure the temperature in the column head and control the boiler temperature.

2 Pressure switches.

7 Sample takings, distributed between all the circuits of the unit.

Regulating valves.

This unit incorporates wheels for its mobility.

Electronic Console:

Metallic box.

Temperature sensors display.

Heating resistance switch.

Pumps switches.

Boiler temperature controller.

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.

OPTIONAL Distillation Column (not included in the standard supply):

- UELL-CP. Distillation column, 5 plates type.

## EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- |  |   |
|--|---|
| 1.- Performance in continuous or discontinuous.    | 10.- Work in discontinuous regarding the supply.                        |
| 2.- Acid-bases valuation.                          | 11.- Study of the extraction process for industrial processes.          |
| 3.- Obtaining of the binodal curve.                | 12.- Analysis of the hydrodynamic liquid-liquid system.                 |
| 4.- Material balances.                             | 13.- Effect of the temperature in the liquid-liquid extraction process. |
| 5.- Flooding velocity calculation.                 | 14.- Studies of efficiency of the extraction.                           |
| 6.- Height interphase regulation.                  | 15.- Solvent recovery effectiveness calculation.                        |
| 7.- Determination of the critical point existence. | 16.- Distillation process control study.                                |
| 8.- Volumetric coefficient of material transfer.   | 17.- Use of other combinations.   |
| 9.- Work in discontinuous regarding the solvent.   | 18.- Calibration of the pumps.  |

## REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.
- Water supply and drainage.
- Air extraction system.

## DIMENSIONS & WEIGHTS

- Dimensions: 1400 x 700 x 1800 mm. approx.
- Weight: 100 Kg. approx.

## RECOMMENDED REAGENTS

- Trichloromethane / acetic acid / water.
  - Trichloromethane / ethanol / water.
- Where the trichloromethane is the solvent and the water plus acetic acid is the feeding.
- Leksol / Propionic acid / water.
- \* The unit is ready for working with a wide range of different chemical products, please consult us the most proper.

## RECOMMENDED ACCESSORIES

- Refractometer.
- Pycnometer.
- Stopwatch.

## OPTIONAL COLUMN

- UELL-CP. Distillation column, 5 plates type.

## AVAILABLE VERSIONS

Offered in this catalogue:

- UELL. **Liquid-Liquid Extraction Unit.**

Offered in other catalogue:

- UELLC. Computer Controlled **Liquid-Liquid Extraction Unit.**

\* Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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REPRESENTATIVE:

