Solid-Liquid Extraction Unit

UESLB

Technical Teaching Equipment

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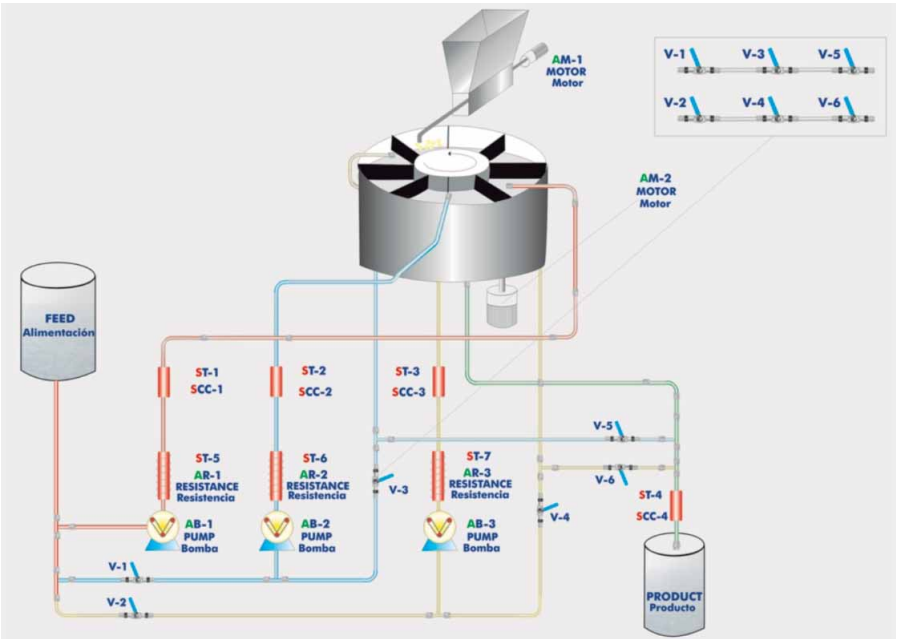
Products
Products range
Units
11.-Chemical Engineering

Electronic console

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



Note:

ST= Temperature sensor.
SCC= Conductivity sensor.
V= Valve.

ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)

Worlddidac Quality Charter Certificate
(Worlddidac Member)

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 UELSB unit 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 "UESLB" unit is laboratory-scale unit designed for studying the separation of a soluble fraction from a solid with the help of a solvent in a continuous multistage and countercurrent way.

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 aluminium structure and panels in painted steel.
Main metallic elements in stainless steel.
Diagram in the front panel with similar distribution to the elements in the real unit.
Feed liquid vessel, capacity: 9 litres.
Product liquid vessel, capacity: 9 litres.
Feed hopper with feed endless screw for solids.
Motor for feed endless screw.
Main rotary extraction vessel with 8 cells of extraction.
Motor for the rotation of the main extraction vessel.
Variable rotation speed.
3 Sprinklers.
Solid products exit.
1 Conductivity meter, and 4 conductivity cells:
- 3 conductivity scales:
  - 200 µS → 0.1 to 199.9 µS.
  - 2 mS → 0.2 to 1.999 mS.
  - 20 mS → 2 to 19.99 mS.
- ∗ mS: microSiemens; mS: miliSiemens.

4 Temperature sensors, "J" type.
3 Heating resistances, range: 360 W each one.
3 Safety thermostats (70°C).
3 Peristaltic pumps (12.7 l./h), with speed regulator.
3 Decanting filters (in-line strainer).
Circulation valves to change the circuit configuration.
Solvent temperatures: ambient to 50°C.
This unit incorporates wheels for its mobility.
Electronic console:
- Temperature sensors connections.
- Digital display for temperature sensors.
- Selector for temperature sensors.
- 3 Controllers for the 3 heating resistances.
- Pumps speed controller.
- Touch screen for controlling:
  - Number of revolutions of the feed motor.
  - Number of cycles.
  - Cycle time.

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.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Demonstration of the operation of a continuous multiple stage process.
2.- Closed circuit percolation extraction (batch reaction).
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, 220V./50Hz or 110V./60Hz.
-Water supply.

RECOMMEDED ACCESSORIES

- Reactant: Sodium bicarbonate.

DIMENSIONS & WEIGHTS

UESLB:

Unit: -Dimensions: 705 x 570 x 1680 mm. approx. (27.75 x 22.44 x 66.14 inches approx.)
-Weight: 120 Kg. approx. (264.5 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.)

AVAILABLE VERSIONS

Offered in this catalogue:

- UESLB. Solid-Liquid Extraction Unit.

Offered in other catalogue:

- UESLC. Computer Controlled Solid-Liquid Extraction Unit.

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

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