

**CE 630**

**Solid-Liquid Extraction**



**Technical Description**

The CE 630 allows a soluble component of a solid mixture to be extracted with a revolving extractor.

In continuous 3-stage mode, pure solvent (distilled water) is delivered from a tank to the sprinkler of the first extraction stage where it is distributed over the solid mixture (extraction material). The solvent seeps through the extraction material, absorbs its soluble components (potassium hydrogen carbonate) and passes into the collecting segments. From there, the enriched solvent is delivered to the sprinkler of the next stage. After passing through the last stage, the extract (the solvent charged with the extracted component) is collected in the extract tank. The extraction material is continuously fed into the cells of the rotating extractor by a spiral conveyor. The extraction material and the solvent move in counterflow. The extraction residue drops into a tank after one revolution of the extractor.

Valves can be used to switch to 1- or 2-stage continuous mode. Discontinuous mode is possible with the extractor stopped.

Three pumps are available for delivering the solvent. Their speed can be individually adjusted for each stage. The temperature of the solvent can likewise be adjusted for each stage with PID controllers. Each stage is equipped with conductivity sensors to monitor the separation process. All measured values can be viewed by software.

The solid mixture (extraction material) is produced prior to the extraction experiment. The carrier material (granular aluminium oxide) is fed into a salt solution (potassium hydrogen carbonate dissolved in water). The carrier material soaked with the salt solution is then dried.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

- \* **Discontinuous and continuous solid-liquid extraction**
- \* **1-, 2- or 3-stage modes possible**
- \* **Regenerable extraction material**
- \* **LabVIEW software with control functions and data acquisition**

**Learning Objectives / Experiments**

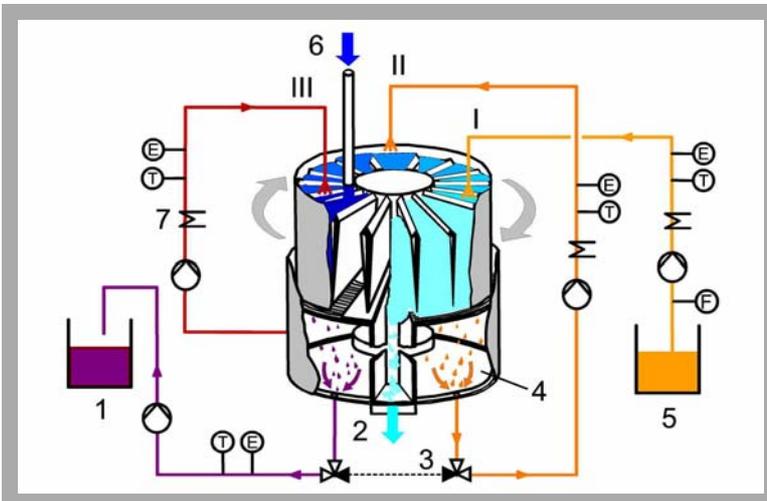
- Fundamentals of solid-liquid extraction
- Demonstration of solid-liquid extraction as a continuous and discontinuous process
- Investigation of 1-, 2- and 3-stage processes
- Influence of solvent flow rate and temperature on the extraction process
- Influence of extraction material feed rate and extractor revolving speed on the extraction process

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1 process schematic, 2 spiral conveyor for extraction material, 3 revolving extractor, 4 revolving extractor drive unit, 5 pump (behind the tanks), 6 tank, 7 mode selector valves, 8 heater and solvent feed, 9 switch cabinet with controls



I-III extraction stages, 1 extract, 2 extraction residue, 3 connection for single-stage mode, 4 collecting segment (stage I), 5 solvent, 6 extraction material, 7 heater; Sensors: T temperature, E conductivity, F flow rate

**Specification**

- [1] Revolving extractor for continuous and discontinuous solid-liquid extraction
- [2] Switching to 1-, 2- or 3-stage modes possible by valves
- [3] Extractor revolving speed adjustable by potentiometer
- [4] Spiral conveyor with variable speed to adjust the extraction material feed rate
- [5] Flow rate of solvent adjustable for each stage via speed of pumps
- [6] Temperature of solvent adjustable for each stage by PID controller
- [7] Tanks for extraction material, extraction residue, solvent and extract
- [8] LabVIEW software with control functions and data acquisition via USB under Windows XP or Windows Vista

**Technical Data**

- Revolving extractor
- 9 cells
  - rotor diameter: approx. 200mm
  - speed: approx. 0...9h<sup>-1</sup>
  - motor power consumption: approx. 0,9W
- Spiral conveyor
- max. feed rate: approx. 20L/h
  - motor power consumption: approx. 4W
- 4 hose pumps
- max. flow rate: approx. 25L/h at 300min<sup>-1</sup> and hose 4,8x1,6mm
- 3 heaters
- power consumption: approx. 330W
- Tanks
- extraction material: approx. 5L
  - extraction residue, solvent, extract: each approx. 20L
- Measuring ranges
- flow rate: 1x 0,025...0,5L/min
  - conductivity: 4x 0...200mS/cm
  - temperature: 4x 0...50°C

**Dimensions and Weight**

LxWxH: 880x700x1740mm  
Weight: approx. 153kg

**Connections**

230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase

**Scope of Delivery**

- 1 trainer
- 1 LabVIEW software CD + USB cable
- 1 packing unit of aluminium oxide
- 1 packing unit of potassium hydrogen carbonate
- 1 set of instructional material

**Order Details**

083.63000 CE 630 Solid-Liquid Extraction