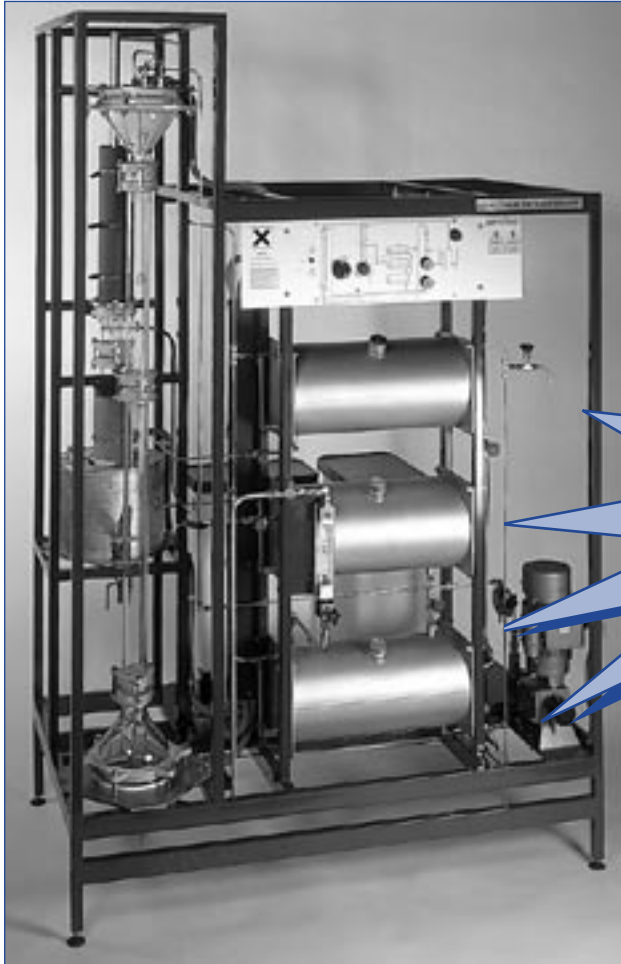




armfield

LIQUID/LIQUID EXTRACTION UNIT

UOP5
issue 12



**With new
environmentally-
friendly solvent
system**

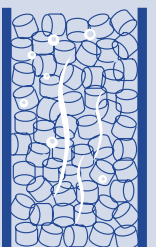
Liquid/liquid extraction is a valuable process in chemical engineering where the separation of one or more of the components from a liquid mixture is required. The Armfield UOP5 unit demonstrates this process in the laboratory so that students may gain a thorough understanding of this industrial technique. Meaningful experiments may be conducted within a two hour laboratory period and students benefit from visual observation of the process.

DEMONSTRATION CAPABILITIES

- *hydrodynamics of liquid/liquid systems*
- *continuous or semi-continuous*
- *operation with organic or aqueous phase as the continuous phase*
- *evaluation of test mixtures for industrial study*
- *mass balances*

Heat and Mass Transfer Unit Operations

UOP



DESCRIPTION

The equipment, mounted in a floor standing, welded steel framework, consists of a glass liquid/liquid extraction column packed with Raschig rings together with an integral distillation column for solvent recovery. Water for the extraction column is pumped from a supply tank via a flow control valve and flowmeter to an injector in the base of the column and flows from an outlet pipe at the top to a collection tank.

Solvent from a stainless steel feed tank is pumped via a metering pump to the top of the column and flows counter-current to the water supply. Solvent drains under gravity to a stainless steel receiver vessel from where it may be directed into the feed tank or to the distillation column boiler. Provision of interface height control allows either the lighter or the heavier phase to be the continuous phase with the counterflow being discontinuous (droplets). Distillate is condensed and collected in a third stainless steel tank. Condensed solvent may also be returned to the feed tank for recirculation.

Sensing electrodes and a solenoid valve control the level of the water/solvent interface at the top or bottom of the column as required. Control of the equipment is simple. A panel displays the complete solvent/water flow system with controls at the appropriate points on the diagram.

The instruction manual included contains experiments, using non-flammable solvents for safety, providing a thorough grounding in the operation of solvent extraction systems in the context of unit operations for chemical engineering students.

Recommended solvent system: Leksol (organic phase), water (aqueous phase) and propionic acid (partitioning solute). Leksol is a non-

flammable organic solvent based on *n*-propyl bromide which is an approved alternative to other solvents such as Trichlorethylene which may also be used. However Trichlorethylene has a detrimental effect on the environment and requires careful handling due to health hazard implications. Efficient ventilation and air extraction are still required as Leksol should not be inhaled.

ORDERING SPECIFICATION

- A glass liquid/liquid extraction column, length 1.2m, diameter 50mm.
- Water feed pump with flow control valve, range 0-800ml/min with 30 litre supply and collection tanks.
- A metering pump, range 0-250ml/min, is used to feed solvent from the 14 litre stainless steel tank.
- A stainless steel distillation column comprising four sieve plates in a glass section, a water cooled condenser, a 1kW 5 litre electrically heated boiler and a stainless steel condensate collection tank, is used for solvent recovery.
- All items are mounted in a floor standing welded steel framework.
- The unit is controlled from a panel with diagrammatic display of the process with controls at appropriate points on the diagram.
- A comprehensive instruction manual is included.

SERVICES REQUIRED

Electrical supply:

UOP5-A: 220-240V/1ph/50Hz

UOP5-B: 120V/1ph/60Hz

UOP5-G: 220V/1ph/60Hz

Cold water supply: mains pressure

Vapour extraction system

OVERALL DIMENSIONS

Height: 2.5m

Length: 1.30m

Depth: 0.75m

SHIPPING SPECIFICATION

Volume: 3.3m³

Gross weight: 380kg

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