

**UOP
SERIES**

Gas Absorption Column – UOP7-MkII

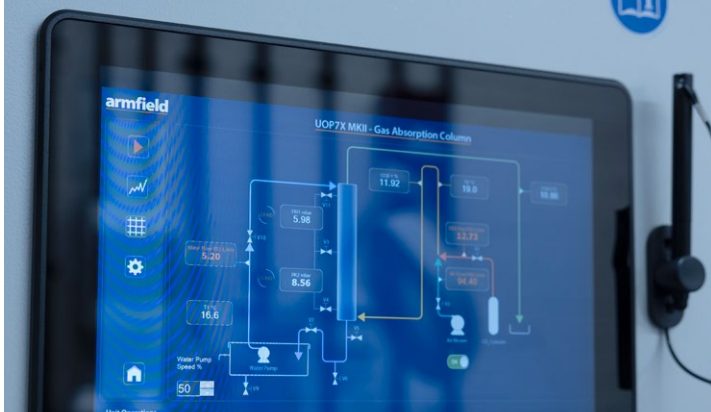
The Armfield Gas Absorption Column has been designed to demonstrate the principles of gas absorption and to provide practical training in the operation of a gas absorption plant.



Raschig packing (supplied)



Touchscreen Interface with Real-time graphing - exportable to Excel or similar



Typical software screen shot - UOP7MKII Process Diagram

Benefits

- ▶ Simple gas absorption and gas desorption demonstration
- ▶ Electronic instrumentation for flow (air, CO₂, liquid), temperature (liquid and gas) and the pressure drops through the column
- ▶ Electronic measurement of CO₂ concentration on the gas inlet and outlet
- ▶ Electronic control of liquid flow
- ▶ Data logging facility

**GAS ABSORPTION COLUMN ASSEMBLY
CO₂ SENSOR ENCLOSURE**



CO₂ Sensors supplied with unit



Requirements

Scale



► Electrical supply:

UOP7-MkII-A: 220-240V/1ph/50Hz, 2A

UOP7-MkII-B: 115V/1ph/60Hz, 4A

UOP7-MkII-G: 220-240V/1ph/60Hz, 2A

Water supply: 5 l/min at 2 bar

CO₂: 20 l/min at 1 bar

Computer: A Windows PC (not supplied) running Windows 7 or later, with USB port is required if running the data logging software

Description

In the process of gas absorption, a mixture of gases is contacted with a liquid, for the purpose of dissolving one or more components of the gas and to provide a solution of them into the liquid.

In the UOP7MkII, a gas phase consisting of CO₂ and air is introduced into the bottom of the column. Adjustment of their flow ratio is obtained by manual valves. A sample of the gas mixture is sent to a CO₂ concentration sensor located inside the electric console, and readings of flows and percentage CO₂ concentration is visible on the display screen as well as in the software.

For the liquid phase, water (or a solution of sodium hydroxide) is pumped to the top of the column where it falls through the packing material. The gas and liquid phase flows counter-currently. This increases the contact time and diffusion of CO₂ into the liquid phase.

The outlet gas leaves the system from the top of the column.

A sample of the outlet gas mixture is also taken and sent to the CO₂ sensor inside the console. Reading percentage of CO₂ is shown on the console display screen.

The liquid leaves the system from the bottom of the column and returns to the feed tank or to drain. Samples of the liquid phase entering and exiting the system can be taken for further analysis via the sampling ports.

Desorption of the CO₂ absorbed in the water line is obtained by aeration of the "enriched" liquid.

Unit Characteristics

The packed absorption column is made of clear acrylic and is installed vertically on a mild steel floor-standing framework. The column is filled with 10mm x 10mm of glass Raschig rings, which are representative of random packing used in gas absorption in industrial applications. Liquid is stored in a feed tank and a variable-speed submersible pump is used to pump the liquid into the column. An electronic flow meter sensor is installed in the liquid stream to provide accurate measurement of the liquid flow entering the column.

The gas to be absorbed is carbon dioxide (CO₂), and would be taken from a pressure cylinder (not supplied). Gas regulator, control valve and electronic flow meter are used to regulate gas flow. A centrifugal fan provides air flow to the column. The air line includes a gate and electronic flow meter for accurate flow control and measurement.

Pressure tapings at the base, centre and top of the column are provided to enable indication of pressure drops in the column using electronic pressure sensors.

Liquid and gas temperature readings are obtained by thermistors in the liquid tank and the inlet gas line.

Overall dimensions

Length	1.017m
Width	0.667m
Height	2.876m (1.781 disassembled)

Packed and crated shipping specifications

Volume	2.2m ³
Gross weight	200Kg

Demonstration Capabilities

- Study of basic principles of the absorption of a gas into a liquid using a packed column
- Determination of loading and flooding points
- Study of hydrodynamic characteristics of a packed column
- Demonstration of physical and chemical absorption
- Investigation of the effectiveness of CO₂ absorption in pure water and in an aqueous solution
- Demonstration of gas desorption
- Determination of the mass transfer coefficient



Ordering specification

- An apparatus for teaching the principles of the absorption of gas into liquid, using a packed column
- Column working length is 1.4m x 80mm diameter, split into two sections
- Two electronic pressure sensors measure the pressure drop across each half of the column
- An electronically controlled submersible pump provides a liquid flow of 1-10 l/min
- 60l feed tank
- Water flow can be used in either recycle or one-pass operation
- Column supplied with 10mm x 10mm Raschig rings as packing material, total volume 7l. Other sizes can be used
- Centrifugal fan provides air flow up to 160 l/min
- Two electronic temperature sensors measure the air and liquid temperatures
- Electronic measurement of CO₂ concentration in the air streams, measurements can be taken at the column inlet and outlet
- Sensor values displayed on an alphanumeric display on the control console
- Data logging as standard (requires PC, not supplied)

Ordering codes

- UOP7-MkII-A: 220-240V / 1ph / 50Hz / 2A
- UOP7-MkII-B: 115V / 1ph / 60Hz / 4A
- UOP7-MkII-G: 220-240V / 1ph / 60Hz / 2A

Armfield standard warranty applies with this product

Knowledge base

- > 28 years expertise in research & development technology
- > 50 years providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

An ISO 9001:2015 Company



armfield.co.uk

Aftercare

Installation
Commissioning
Training
Service and maintenance
Support: armfieldassist.com