DISCOVER WITH armfield

UOP SERIES: HEAT & MASS TRANSFER OPERATIONS

GAS ABSORPTION COLUMN – UOP7

DEMONSTRATION CAPABILITIES

> *Study of the basic principles of the absorption of a gas into a liquid using a packed column*

> *Demonstration of methods of gas and liquid quantitative analysis*

> *Production of mass balances for a packed absorption column*

> *Method of transferring units, including calculation of NTU and HTU*

> *Determination of the Mass Transfer Coefficient*

> *Study of the hydrodynamic characteristics of a packed column*

> *Determination of loading and flooding points*

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

REGISTERED FIRM BM TRADA CERTIFICATION ISO 9001 UKAS QUALITY MANAGEMENT 012

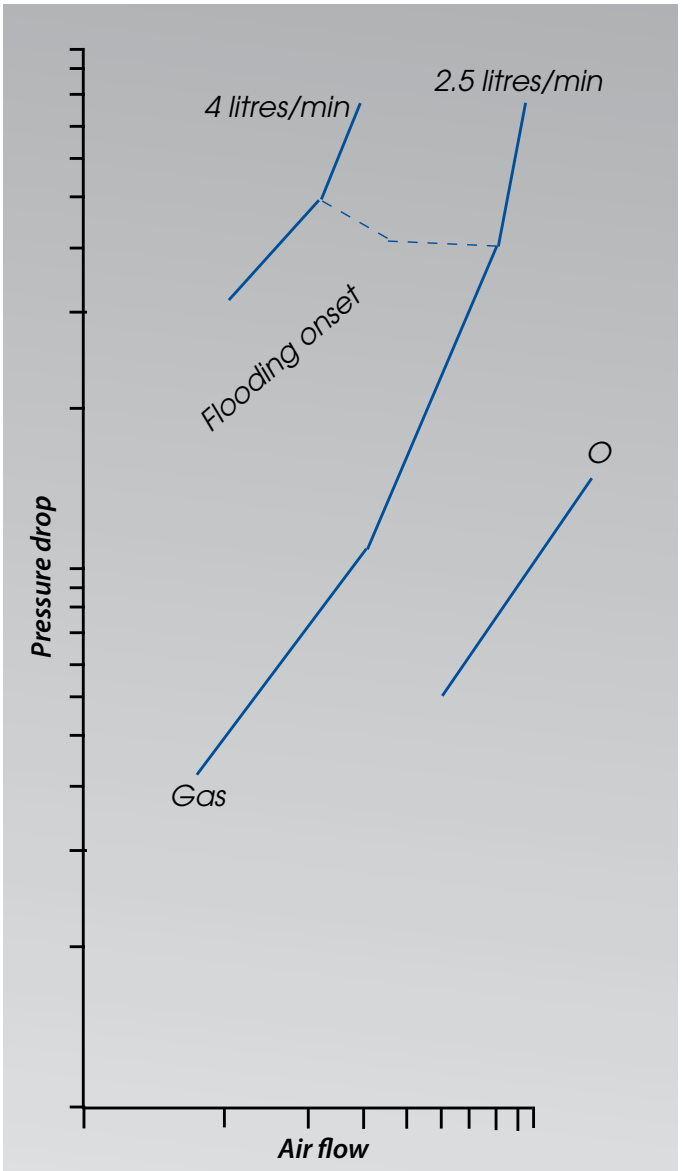
<EXTENDED> WARRANTY 2 years 2YR WARRANTY ON ALL ARMFIELD PRODUCTS

DESCRIPTION

The packed absorption column is made up of two 80mm diameter clear acrylic sections joined end to end and installed vertically on a mild steel floor standing framework. The column is filled with 10mm x 10mm glass Raschig rings, which are representative of the type of packing used in gas absorption. Liquid for the process is stored in a 50.0 litre rectangular feed tank and a centrifugal pump is used to deliver the liquid to the top of the column where it falls through the packing and returns to the tank. A variable area flow meter in the recirculation line gives a direct reading of flow rate.

The gas to be absorbed is normally carbon dioxide and would be taken from a pressure cylinder (not supplied), standing adjacent to the column. This gas passes through a calibrated variable area flow meter and is mixed with an air stream also of known flow rate from a rotary compressor positioned in the framework. The ratio of gas to air in the mixture entering the column is therefore known and is easily varied. Entering at the base of the column, the gas mixture rises up through the packed bed and is counter-currently contacted with the liquid flowing down the column.

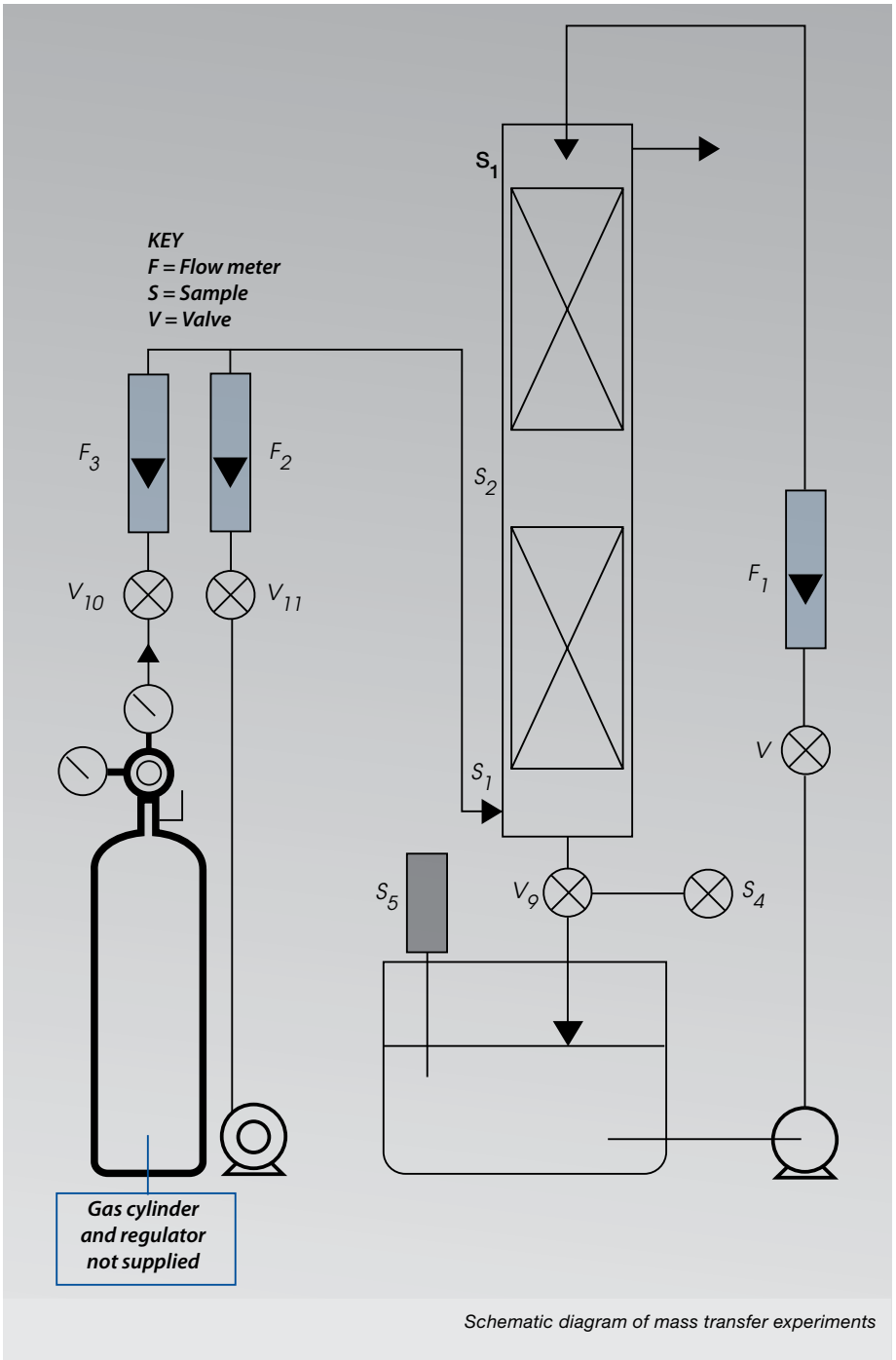
Pressure tappings at the base, centre and top of the column are provided to allow indication of pressure drop in the column using manometers. These tappings also provide a means of extracting samples of gas from the column. Carbon dioxide content of the gas samples is determined using a Hempl apparatus. Flow meters, manometers and gas analysis equipment are all mounted on a vertical backboard at a convenient height for operation.



Pressure drop versus air flow for different flow rates

TECHNICAL DETAILS

Feed tank capacity:	***50.0 litres***
Internal diameter of column:	***0.80mm***
Volume of packing:	***7.0 litres***
Height of absorption column:	***1.4m***
Type of packing:	***Raschig rings 10x10mm***
Air compressor capacity:	***0.15m³/min@0.3bar***
Column feed pump capacity:	***10.0 l/min@3m***
Air flow meter range:	***20-180 l/min***
Gas flow meter range:	***1.0-22.0 l/min***
Water flow meter range:	***1.0-10.0 l/min***



Schematic diagram of mass transfer experiments

REQUIREMENTS

Electrical supply:

UOP7-A:	*220-240V/1ph/50Hz*
UOP7-B:	*120V/1ph/60Hz*
UOP7-G:	*220-240V/1ph/60Hz*

Water supply: 10L/min @ 1bar

ESSENTIAL EQUIPMENT

CO_2 Cylinder with pressure regulator

RECOMMENDED ANCILLARY EQUIPMENT

Vent piping to outside laboratory
Titration glassware for liquid analysis
Separate drain tank for treatment of effluent

OVERALL DIMENSIONS

Height:	*2.53m*
Width:	*0.90m*
Depth:	*0.65m*

SHIPPING SPECIFICATION

Gross weight	*220kg*
Volume	*2.0m³*

ORDERING SPECIFICATION

- *Floor mounted packed column gas absorption unit using a 80mm diameter, 1.4m long acrylic column. The column contains 7 litres of 10 x 10mm glass Raschig rings and is mounted in a steel frame*
- *Pressure sensing and gas sampling points are sited at the top, centre and base of the column*
- *Two manometers are included to measure pressure*
- *A Hempl type gas analysis apparatus is included*
- *Three variable area flow meters are included to measure the flow of gas, air and liquid*
- *A rotary compressor is used to pump air into the column*
- *Water (solvent) is circulated using a centrifugal pump, using a 50 litre capacity feed tank*
- *A comprehensive instruction manual is supplied which details the necessary installation, commissioning and maintenance procedures*
- *The instruction manual also includes detailed experimental protocols for studying:*
  - *o Principles of gas absorption into a liquid using a packed column*
  - *o Methods of gas and liquid quantitative analysis*
  - *o Mass balancing over a packed absorption column*
  - *o Method of transferring units, including calculation of NTU and HTU*
  - *o Determination of the mass transfer coefficient*
  - *o Hydrodynamic characteristics of a packed column*
  - *o Determination of loading and flooding points*

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