

MASS TRANSFER LAB

S. No.	Equipment	Make & Model	Manufacture	Qty
1	Liquid / Liquid Extraction Unit	UOP5-A	Armfield	1
2	Gas Liquid Absorption	UOP7-A	Armfield	1
3	Diffusion of a Liquid Apparatus	CER A-A	Armfield	1
4	Gaseous Diffusion Coefficient Apparatus	CER B	Armfield	1

LIQUID/LIQUID EXTRACTION UNIT



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.

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

SPECIFICATION

Volume: 3.3m³

Gross weight: 380kg

GAS LIQUID ABSORPTION COLUMN



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.

The packed absorption column is made up of two 75mm diameter borosilicate glass sections joined end to end and installed vertically on a mild steel floor standing framework. The column is filled with 10mm x 10mm Raschig rings, also glass, 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.

TECHNICAL DETAILS

Feed tank capacity: 50.0 litres

Diameter of column: 0.075m

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:

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

SERVICES REQUIRED

Electrical supply:

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

UOP7-B: 120V/1ph/60Hz

UOP7-G: 220-240V/1ph/60Hz

Initial water fill

ESSENTIAL ANCILLARY EQUIPMENT

CO₂ 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

SPECIFICATIONS

Volume: 2.0m³

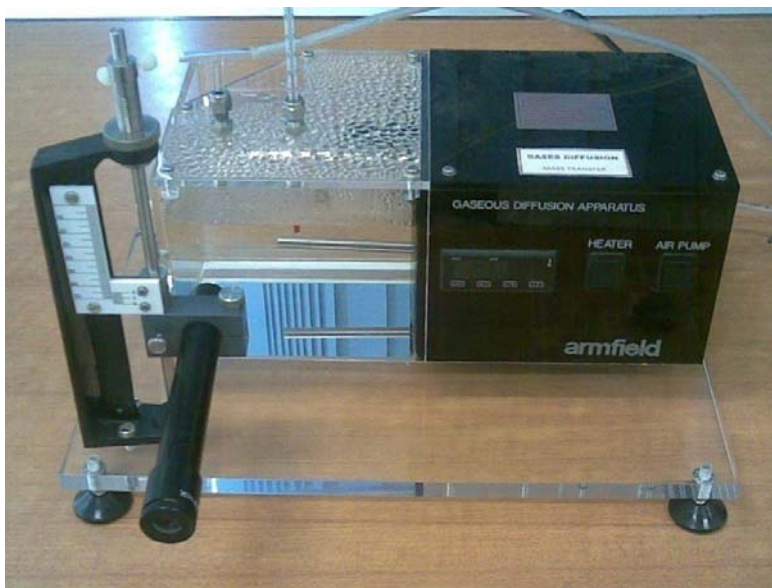
Gross weight: 220kg

MASS TRANSFER AND DIFFUSION COEFFICIENTS

CERa/CERb

Two separate items of laboratory equipment have been designed to allow measurement of molecular diffusivities and, in so doing, to familiarise students with the basic notions of mass transfer theory. The gaseous diffusivity apparatus (CERa) involves diffusion with bulk flow, whilst the liquid diffusivity apparatus (CERb) relates to an equi-molar counter-diffusion process.

CERa Gaseous Diffusion Coefficients Apparatus



The diffusion of a vapour 'A' from a volatile liquid into another gas 'B' can be conveniently studied by confining a small sample of the liquid in a narrow vertical tube, and observing its rate of evaporation into a stream of gas 'B' passed across the top of the tube.

CERb Liquid Diffusion Coefficients Apparatus



Armfield has developed a unique diffusion cell which overcomes the traditional problem of slow diffusion rates in liquids requiring long observation times, but without sacrificing accuracy or introducing convective effects.

Essentially, the cell consists of a honeycomb of accurately dimensioned capillaries, positioned between two liquids of differing concentration of the solute whose diffusion coefficient is to be determined.

SERVICES REQUIRED

Electricity supply:

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

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

CERb: Battery operated

OVERALL DIMENSIONS

CERa Gaseous Diffusion Coefficient Apparatus

Height: 355mm

Width: 450mm

Depth: 390mm

CERb Diffusion Apparatus

Height: 310mm

Diameter: 190mm

Conductivity Meter

Height: 130mm

Width: 150mm

Depth: 250mm

SPECIFICATION

CERa: Volume: 0.20m³

Gross Weight: 30kg

CERb: Volume: 0.10m³

Gross Weight: 10kg