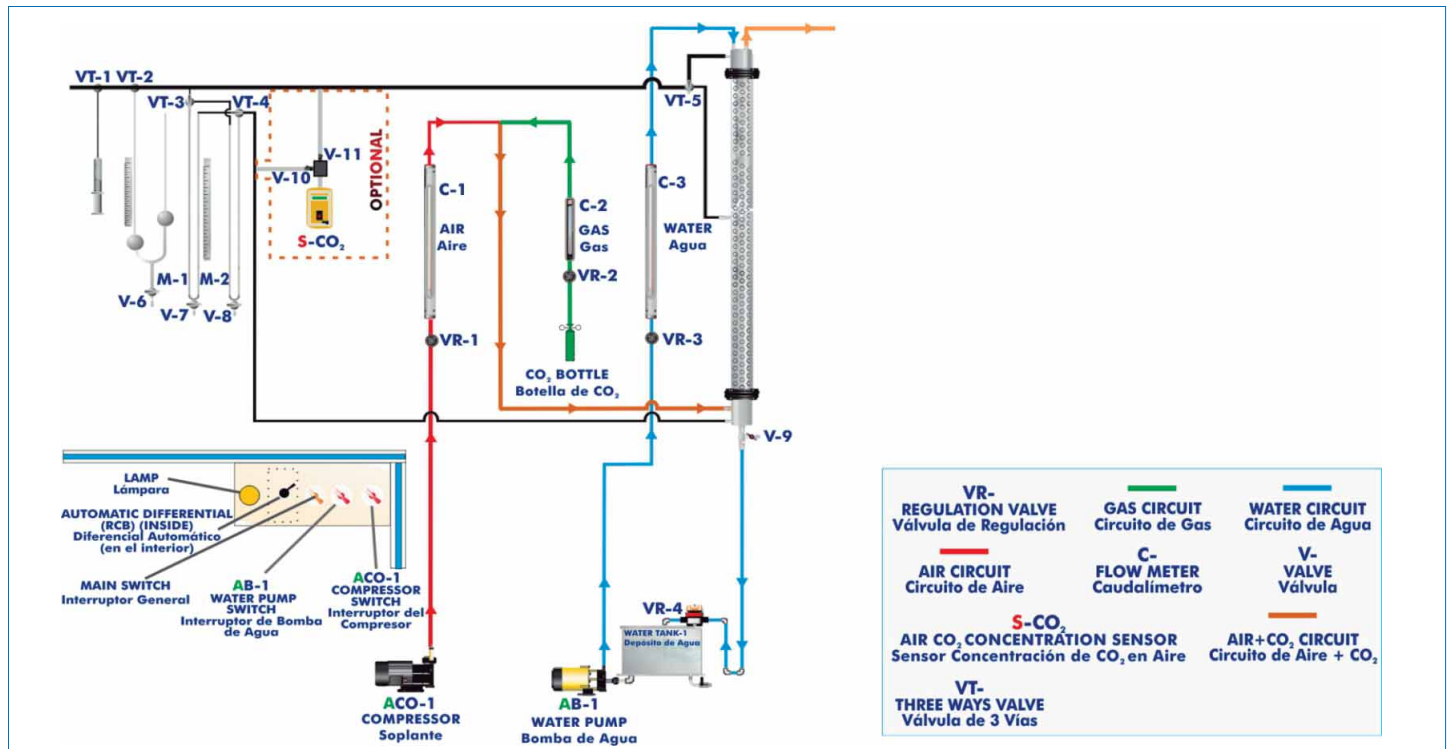




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## PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



ISO 9000: Quality Management  
 (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate  
 (total safety)



Certificates ISO 14000 and  
 ECO-Management and Audit Scheme  
 (environmental management)



Worlddidac Quality Charter  
 Certificate and  
 Worlddidac Member

## INTRODUCTION

Absorption is a basic operation of mass transfer that consists on the separation of some components of a gaseous mixture by contact with an adequate solvent.

Mass transfer separation operations imply the contact of two immiscible phases. This contact can be intermittent, as it happens in plate columns, or continuous, as it happens in packed columns.

Some processes that demonstrate the importance of absorption are:

- The recovery of solvent vapors or natural gasoline from gaseous currents.

- The treatment of gases in refineries.

- The decontamination of industrial gases.

The Gas Absorption Column "CAG" is a laboratory scale unit designed to study hydrodynamic and absorption processes in a packed column.

## GENERAL DESCRIPTION

The gas absorption column is a scale unit designed to study hydrodynamic and absorption processes in packed columns. This system absorbs ammonia or  $\text{CO}_2$  from a mixture with air in a watery solution that descends along the column.

The main parts of the unit are:

**Packed column:** it consists of a glass cylindrical column filled with Raschig rings.

**Liquid circuit (water):** the liquid, that is stored in a PVC tank, is impelled towards the column by a pump. It feeds the column through its upper end using a glass diffusion shower. After crossing the column, the liquid is returned to the storage tank. The liquid flow that arrives to the column is measured with a flowmeter.

**Gas circuit (air and  $\text{CO}_2$ ):** it consists of a  $\text{CO}_2$  and air (supplied by a blower) mixture current. Both gaseous currents are mixed, and later they enter the base of the column through a side inlet located below the bed level, so that the gaseous mixture is as homogeneous as possible. Both gas flows are measured by flowmeters.

**$\text{CO}_2$  measuring system:** it allows to determine the concentration of this gas in the currents originated from the upper and central parts of the column.

## SPECIFICATIONS

This unit is mounted on an anodized aluminum rigid structure, with panels of painted steel.

This unit has wheels for its mobility.

Main metallic elements of stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

**Packed column:**

- It consists of a glass cylindrical column of 1400 mm of height and 75 mm of internal diameter.

- It is filled with Raschig rings of 10 mm diameter.

- It includes glass ends for inlet and outlet of gases and liquids and for sample point.

**Liquid circuit (water):**

- A PVC glass storage tank (40 l. capacity).

- A centrifugal pump (maximum flow rate: 540 l./h.).

- The liquid flow that arrives at each moment to the column is measured with a flowmeter.

- A glass diffusion shower.

- PVC conduit for the effluent liquid with a control flow valve and one sampler.

**Gas circuit (air and  $\text{CO}_2$ ):**

- Compressor (blower) provides a maximum flow of  $6 \text{ m}^3/\text{h}$  and a maximum pressure of 1 bar.

- The gas ( $\text{CO}_2$  or ammonia) is supplied by a cylinder, type bottle. (Not supplied with the unit).

- Mixing system for the 2 gases streams.

- Both gas flows are measured by 2 flowmeters installed in the panel.

- 2 Control flow valves.

**Instrumentation for the analytical measurement of  $\text{CO}_2$ :**

- A glass syringe of 100 ml capacity, dedicated to extract the specific quantities of a sample to be analysed.

- Two glass tanks located at different heights and interconnected. They contain an aqueous solution of KOH, in which the contained  $\text{CO}_2$  will be absorbed in the sample of gas to analyze.

- 3 Way-valves to direct the gaseous currents during the analysis process.

There are transparent elements allowing a better visualization of the process.

**Electrical console, with:**

- Lamp. Automatic differential (RCB). Compressor switch. Pump switch.

**Cables and accessories, for normal operation.**

**Manuals:**

- This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

Optional accessory:

- CAG/M: Manual meter to measure the concentration of  $\text{CO}_2$  in a gaseous current directly.

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Study of the basic principles of the absorption of a gas into a liquid using a packed column.
  - 2.- Gas stream analysis.
  - 3.- Study of the hydrodynamic characteristics of a packed column.
  - 4.- Determination of the drag and flooding flows.
  - 5.- Determination of the mass transfer coefficient.
  - 6.- Checking of the mass balances.
  - 7.- Demonstration of methods of gas and liquid quantitative analysis.
  - 8.- Investigations of the variables influencing the effectiveness of the absorption.
- Additional practical possibilities:
- 9.- Determination of the water, CO<sub>2</sub> and air flow.
  - 10.- Head loss in the column.
  - 11.- Measurement of the CO<sub>2</sub> concentration in gaseous currents using a CO<sub>2</sub> meter (with the optional accessory CAG/M).

## REQUIRED SERVICES

- Electrical supply: single-phase, 220V. / 50Hz. or 110V. / 60 Hz.
- Water supply and drainage.
- Vent piping to outside laboratory.

## DIMENSIONS & WEIGHT

- Dimensions: 1000 x 740 x 2600 mm. approx.  
(39.37 x 29.13 x 102.3 inches approx.)
- Weight: 100 Kg. approx.  
(220 pounds approx.).

## REQUIRED ACCESSORIES

- Gas bottle CO<sub>2</sub> or ammonia.

## RECOMMENDED ACCESSORIES

- General instrument for liquid titration.
- Draining tank for treatment of effluents.

## OPTIONAL ACCESSORIES

- CAG/M: Manual meter to measure the concentration of CO<sub>2</sub> in a gaseous current directly.

## AVAILABLE VERSIONS

- Offered in this catalogue:
- CAG. Gas Absorption Column.
- Offered in other catalogue:
- CAGC. Computer Controlled Gas Absorption Column.

\*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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