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Units
11.- Chemical Engineering

INTRODUCTION

The absorption is a basic operation of the mass transfer consisting in the separation of some components of a gas mixture by means of contact with a appropriate solvent.

The mass transfer separation operations imply the contact of two non-miscible phases that shall sometimes be intermittent, as in the stage columns, and other times it shall be continuous, as in the packed columns.

The column used in this unit for studying the absorption processes is a packed column.



ISO 9000: Quality Management
(for Design, Manufacturing,
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European Union Certificate
(total safety)



**Certificates ISO 14000 and
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(environmental management)



**Worlddidac Quality Charter
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DESCRIPTION

The gas absorption column(CAG) is an unit designed for studying hydrodynamics and absorption processes in packed columns.

The installation absorbs CO₂ or ammonia from an air mixture into an aqueous solution flowing down the column.

The Unit consists of the following parts: packed column, liquid (water) circuit, gas (air and CO₂) circuit and measurement and analysis elements.

The packed column is a glass cylindrical column of 1400 mm. height and 75mm. diameter, with 8 mm. diameter glass Raschig rings packing material.

The liquid circuit includes a PVC glass 40 litres tank that feeds water with a centrifugal pump.

The flow rate is measured with a meter placed in the front panel. Once the column is crossed, the effluent liquid is sent back to the storage tank.

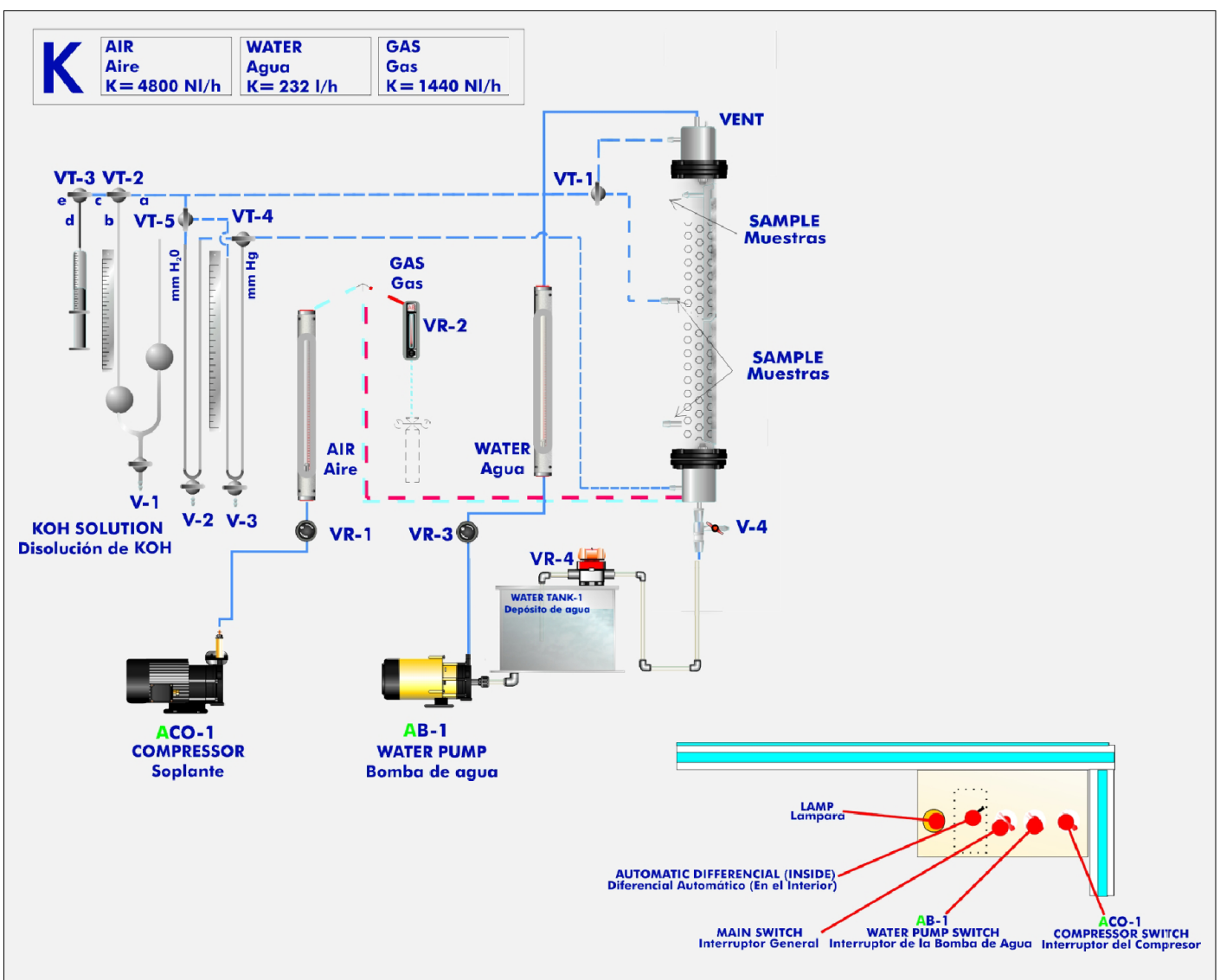
The gas circuit is formed by an air blower (compressor) that supplies air and a pressure cylinder (not included) that supplies CO₂ or ammonia.

The flow rate of both gases are measured by means of two meters installed in line in the front panel.

The two gas streams are mixed and introduced in the base of the column trough a lateral inlet.

The measurement and analysis elements include two manometric tubes for determining the pressure drops across the column and an equipment for the CO₂ analysis.

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



SPECIFICATIONS

The gas absorption column CAG is an unit designed for studying hydrodynamics and absorption processes in a packed column.

The unit is mounted on an anodized aluminium rigid structure with panels in painted steel (epoxy paint).

This unit has wheels for its mobility.

Main metallic elements in stainless steel.

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

Packed column consists of a glass cylindrical column of 1400 mm. of height and 75 mm. of internal diameter. This column is filled with Raschig rings of 8 mm. diameter. It includes glass ends for inlet and outlet of gases and liquids and for sample points.

Liquid circuit (water) and gas circuit (air and CO₂).

The liquid, that is stored in a PVC glass tank (40 litres capacity), is impelled towards the column with the help of a centrifugal pump (maximum flow rate: 540 l./h.).

The water flow that arrives in each moment to the column is measured with an in-line flow meter located in the panel.

The liquid feeds to the column through its upper end via one glass diffusion shower that assures a uniform distributing in the filler.

After crossing the column, the liquid effluent is returned to the storage tank through a PVC conduit with hydraulic seal (to avoid possible gas leaks) in which there are a control flow valve and one sampler.

Compressor (blower) provides a maximum flow of 6 m³/h and a maximum pressure of 1 bar.

The gas (CO₂ or ammonia) is supplied by a cylinder, type bottle. (Not supplied with the unit).

The both gas flows are measured by means of in-line flowmeters installed in the panel.

Mixing system of 2 gases streams.

2 Manometric tubes (for determining the head loss along the column).

A CO₂ measurement equipment, that allows to determine the concentration of this gas in the currents originating from the upper and central parts of the column. It is formed by:

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

Two glass tanks located at different heights and interconnected. They contain an aqueous dissolution of KOH, in which the contained CO₂ will be absorbed in the sample of gas to analyze.

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

Connection elements.

Rapidity and facility to replace parts of the unit, in case of failure or braking.

There are transparent elements allowing better visualization of the process.

Electrical console, with:

Lamp.

Automatic differential.

Main switch.

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.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

- 1.- Study of the basic principles of the absorption of a gas into a liquid using a packed column.
- 2.- Gas streams 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.- Determination of the air flow.
- 9.- Head loss in the column.
- 10.- Investigation of the variables influencing the effectiveness of the absorption.

REQUIRED SERVICES

- Electrical supply: single-phase, 220V. / 50Hz. or 110V. / 60 Hz.
- Water supply and drainage.

DIMENSIONS & WEIGHTS

- Dimensions: 1000 x 740 x 2600 mm. approx.
- Weight : 100 Kg. approx.

REQUIRED ACCESSORIES

- Gas bottle CO₂ or ammonia.

RECOMMENDED ACCESSORIES

- Vent piping to outside laboratory.
- General instrument for liquid titration.
- Draining tank for treatment of effluents.

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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