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 Products
 Products range
 Units
 ↳ 1.-Chemical Engineering



Electronic Console

DESCRIPTION

The QDTG is a teaching unit that allows to students familiarise with the notions of mass transfer theory, specifically about the diffusion of a volatile liquid into an inert gas, obtaining experimental data and results which are very useful for a correct practice understanding of the process and, consequently, for the technical teaching of the students.

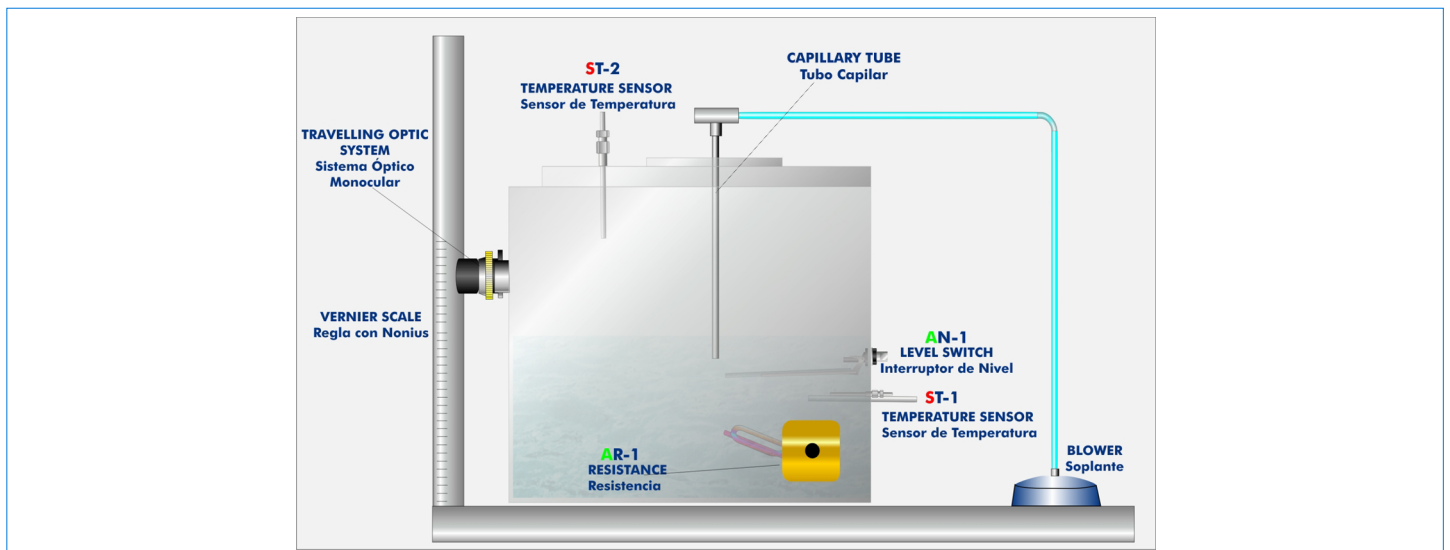
The experimental determination of the diffusion coefficient, D_{AB} , for a binary mixture, can be done with a device such as a test tube with such dimensions that the effects in the limits of the system can be ignored. Suppose, thus, that a pure liquid A evaporates slowly and constantly inside it, and that its vapours are diffused through an inert and quiet gas B. During the experiment, temperature and pressure will be constant. On the other hand, it will only be considered diffusion in the direction of 'z' axis.

These assumptions are obtained if a glass capillary tube is used instead of a test tube. This capillary tube will have a volatile solvent (pure liquid A) and a gas (air, in this case) which will flow horizontally in laminar regime.

In order to vary the temperature of the volatile solvent there is a thermostatic bath, which will operate by the method colloquially called "bain-marie".

The experiment will consist on measuring the heights difference in a time interval using a calibrated device that allows measuring distances.

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



Unit:

Bench-top unit.

Anodized aluminium structure and panels in painted steel.

Main metallic elements in stainless steel.

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

A precision glass capillary tube (a narrow vertical tube with a known inside diameter).

Air pump with air regulator. Range: 0-7 l/min.

Travelling optic system with accurate focus adjustment and mounted for vertical axis movement against a Vernier scale (Vernier range: 0-300 mm).

A thermostatically controlled water transparent - sided Bath. Capacity: 36 litres.

Heating resistance: 500 W. (Max. temperature 60°C).

2 Temperature sensors, "J" type.

Level switch.

Electronic Console:

Metallic box.

Front panel:

Water (water bath) temperature digital controller.

Heater resistance switch.

Air pump switch.

Level switch connector.

Temperature sensors connectors.

Digital display for the sample temperature.

Main Switch.

Back panel:

Heating resistance connection.

Pump connection.

Two 3A fuses.

Power supply connection.

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:

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|---|---|
| <p>1.- Fick's law application to calculate the diffusivity.</p> <p>2.- Direct measurement of mass transfer rates.</p> <p>3.- Determination of molar density transfer rate.</p> <p>4.- Study of the effect of temperature on diffusion coefficients.</p> <p>5.- Use of gas laws to calculate concentration differences in terms of partial pressures.</p> <p>6.- Graphic representation of the concentration profiles.</p> | <p>7.- Gaining familiarity with the use of laboratory instruments to achieve measurements of data required for industrial process design.</p> |
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REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.
- Volatile liquid (for example: acetone).

RECOMMENDED ACCESSORIES

- Stop clock.

DIMENSIONS & WEIGHTS

QDTG:

- Unit: -Dimensions: 600 x 570 x 570 mm. approx.
-Weight: 30 Kg. approx.
- Electronic Console: -Dimensions: 300 x 230 x 135 mm. approx.
-Weight: 2 Kg. approx.

AVAILABLE VERSIONS

Offered in this catalogue:

- QDTG. **Gaseous Mass Transfer and Diffusion Coefficient Unit.**

Offered in other catalogue:

- QDTGC. Computer Controlled **Gaseous Mass Transfer and Diffusion Coefficient Unit.**

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



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