Order Code : 25269360.1
Gaseous Diffusion Coefficient Apparatus

Gaseous Diffusion Coefficient apparatus for investigation of mass transfer and gaseous diffusion has traditionally used a capillary tube in a hot water bath, with a travelling microscope used to measure the rate of diffusion over a period of time. Although capable of giving good results, this type of apparatus was not without its disadvantages, particularly ease of use.

Experiments:

- To determine the diffusion coefficient of a gas by evaporation from a liquid surface
- Direct measurement of mass transfer rates in the absence of convective effects
- Use of gas laws to calculate concentration differences in terms of partial pressures
- Use of Fick's law to measure diffusion coefficients in the presence of stationary gas
- Measurement of the effect of temperature on diffusion coefficients
- Investigation into diffusion coefficients of alternative fluids
- Gaining familiarity with the use of laboratory instruments to achieve accurate measurements of data required for industrial process design

Technical Specifications

- A self-contained bench mounted apparatus for the determination of diffusion coefficients of a vapour in air
- The apparatus blows air across the top of the capillary tube, inside diameter 2mm
- The tube is contained in a heated aluminium block with a 25W heater
- The temperature control system maintains the block to be better than +/- 1°C from

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ambient to 60°C.

- Operating temperature typically achieved in 20 minutes (40°C operation)
- The equipment incorporates a high definition USB microscope with a resolution of 1600 x 1200 and preset to an optical gain of approximately x37
- Microscope and heater block containing the capillary are visible to the user and internal illumination of the capillary is provided
- Viewing length of the capillary is 12mm
- Physical reference scale provided (can be used for software calibration)
- Phase boundary measurement resolution < 0.0002mm
- Powered by universal power adaptor with worldwide approvals
- Software can create individual images under operator control, multiple timed images under automatic control or time lapsed video. Images can be time and date tagged. Time lapse periods can be set from five seconds to many days.
- Output formats include .jpg .bmp .avi

Electrical supply:

- Requires 24V DC at 2.5A
- The equipment is supplied with a universal mains adaptor suitable for
- 100V to 240V AC, 50/60Hz
- Software requires the user to have a PC running Windows 7 or above with a USB port.

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