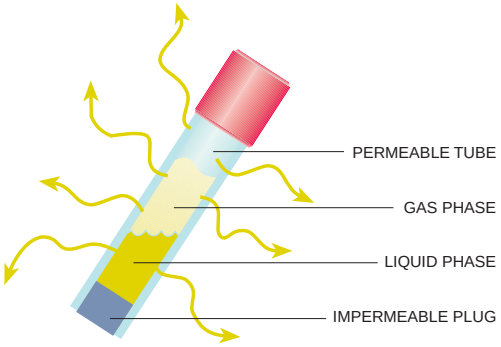
Tools for Science & Medicine

VICI Metronics Inc.

Dynacal® Permeation Tubes

- PPB to high PPM range
- Accurate, stable concentrations
- Safe and convenient
- Economical, flexible alternative to bulky bottled mixtures
- NIST traceable



Description

Dynacal permeation devices are small, inert capsules containing a pure chemical compound in a two phase equilibrium between its gas phase and its liquid or solid phase. At a constant temperature, the device emits the compound through its permeable portion at a constant rate.

Permeation devices are typically inserted into a carrier flow to generate test atmospheres for calibrating gas analyzer systems, testing hazardous gas alarms, or conducting long-term studies of effects on materials or biological systems – in short, any situation requiring a stable concentration of a specific trace chemical.

Accuracy

The purpose of a calibration gas standard is to establish a reference point for the verification of an analysis. Permeation tube rates can be certified using standards traceable to NIST by the most basic and accurate laboratory procedure – measuring the gravimetric weight loss over a known period of time at a known temperature.

Availability and Delivery

Permeation rate data is already established for hundreds of different compounds, and rates for new compounds can be easily certified using NIST-traceable standards. Their small size and inherent stability allow us to inventory thousands of devices for delivery from stock, and because of the size and the limited quantity of chemical fill, we can offer overnight delivery via air express.

Advantages Over Bottled Standards

Calibration devices from VICI Metronics offer several key advantages over cylinder-supplied gas calibration standards.

Economy is always a major consideration; customers who have done the arithmetic, factoring in the cost of cylinder purchase, rental fees, shipment, and disposal, typically discover that the purchase of a Dynacalibrator and a supply of permeation devices will start to save them money in the second year of use.

Multicomponent mixtures can be easily generated with a Dynacalibrator and the appropriate combination of permeation devices. This technique also allows the removal of a single component from a gas mixture by simply removing the appropriate permeation device. Alternative methods require expensive custom mixtures or a large number of gas cylinders, which consume valuable lab space as well.

Bottled standards can also have problems arising from degradation of the standard within the cylinder, from changes in the concentration levels as the cylinder pressure changes, and from interaction of calibration components and surfaces.

Types of Devices

Tubular Device

The tubular device, a sealed permeable tube containing the desired permeant gas, is the most widely used of the various permeation devices. Release of the chemical fill occurs by permeation through the wall of the PTFE tube for the entire length between the impermeable plugs. A wide range of rates can be achieved by varying the length and thickness of the tube, with typical rates ranging from 5 ng/min to 50,000 ng/min. We can supply tubular permeation devices with active lengths (the length of the permeable section) ranging from 0.5 cm to 20 cm.

Extended Life Tubular Device

Our unique extended life tubular (XLT) device is essentially a standard tubular device coupled to an impermeable stainless steel reservoir. This design offers a range of permeation rates corresponding to a tubular device, but with significantly enhanced lifetime – by a factor of 3 for a 5 cm (active length) device or a factor of 12 for a 1 cm device.

Wafer Device

Wafer devices have only a small permeable window, or wafer, so permeation rates are typically lower than rates for tubular devices by an order of magnitude. Since permeation occurs only through the polymeric wafer, the permeation rate is controlled by varying the wafer material, the thickness of the wafer, and the diameter of the permeation opening. Gases whose high vapor pressure at normal permeation temperatures prevent their containment in a tubular device can be contained in a wafer device. Wafer devices are available in different styles to allow use in calibrators made by various manufacturers.

Typical Compounds

Literally hundreds of compounds are available in permeation devices. Some of the most typical compounds include:

- Ammonia
- Benzaldehyde
- Benzene
- Carbon Disulfide
- Chlorine
- Dimethyl Sulfide
- Ethanol
- Formaldehyde
- Freons
- Hydrogen Fluoride
- Hydrogen Sulfide
- Isopropyl Alcohol
- Mercury
- Methanol
- Methyl Bromide
- Nitrogen Dioxide
- Phenol
- Sulfur Dioxide
- Sulfur Hexafluoride
- Toluene
- Water
- Xylene