



National Bureau of Standards

Certificate of Calibration

Standard Reference Material 1912

Tetrachloroethylene Permeation Device

This Standard Reference Material (SRM) is a tetrachloroethylene permeation device, individually calibrated. SRM 1912 is intended for use in the standardization of apparatus and procedures used in air pollution and related chemical analyses and for the preparation of gas mixtures of known tetrachloroethylene content.

The certified permeation rate in micrograms of tetrachloroethylene per minute at 25.0 °C is _____.

Serial Number _____ Date of Calibration _____

The uncertainty of the certified permeation rate is two standard deviations of the mean of ten measurements of the permeation rate over a 12 month period. The certified value is valid within these limits for a period of one year from the date of shipment from the National Bureau of Standards.

Note: The certified value of this permeation device is valid only if the use and recommended storage conditions given on page 2 are followed.

The tetrachloroethylene permeation device was calibrated in the Gas and Particulate Science Division, Center for Analytical Chemistry by G.D. Mitchell. The overall direction and coordination of the technical effort leading to the certification of this Standard Reference Material were performed under the chairmanship of W.L. Zielinski and H.L. Rook.

The technical and support aspects involved in the certification and issuance of this SRM were coordinated through the Office of Standard Reference Materials by R.W. Seward.

Gaithersburg, MD 20899
September 9, 1985

Stanley D. Rasberry, Chief
Office of Standard Reference Materials

(Over)

Notice and Warnings to Users:

Tetrachloroethylene has been defined by NIOSH as a possible carcinogen, therefore this SRM should be treated as a potential health hazard. Techniques used in handling radioactive and infectious materials are applicable to this SRM. Users in the United States should contact their Regional Office of the U.S. Environmental Protection Agency for information regarding proper disposal of these materials; in other countries, they should contact the appropriate organization responsible for public health or environmental control.

USE:

This device can be used to produce known concentrations of tetrachloroethylene in air or another gas by placing the device in a stream of the pure, dry air/gas (e.g., nitrogen) flowing at a known rate and at a known constant temperature. The accuracy of the concentration produced depends not only on the accuracy of the certified permeation rate, but also on the accuracy with which the purity of the air/gas, the rate of flow, and the temperature are known. Systems for generating known concentrations using permeation devices are described in ASTM D-2914.

When the device is first placed in service, a period of at least four weeks should be allowed for equilibration at the temperature at which it is to be used. Note: See "Storage" below. The device should be used at the calibration temperature of 25.0 °C; however, if the temperature used does not exceed more than 5 °C above or below 25 °C, an adjustment to the rate may be made according to the equation:

$$\text{Log } R_t = \text{Log } R_{25} + 0.0355 (t - 25.0)$$

where R_t is the permeation rate of the device at temperature, t (°C), and R_{25} is the certified permeation rate of the device at 25.0 °C. The constant, 0.0355, was empirically determined using observations of the temperature-rate relationships for identical devices at temperatures between 20 and 30 °C. The additional uncertainty in the calculated value for the permeation rate at temperatures up to 5 °C above or below 25.0 °C is approximately ± 5.0 percent of the certified permeation rate.

STORAGE:

The polymers from which this device is constructed will absorb organic compounds (including tetrachloroethylene) if exposed to high concentrations of these compounds during storage. Subsequent desorption of these compounds during use may result in a concentration different from that predicted by the certified rate. Therefore, upon receipt, this device must be removed from the shipping container and immediately stored in a chamber through which a flow of at least 100 mL/min of dry air/gas is continuously passed. Low temperature storage of the device is not recommended. Prolonged exposure of the device to temperatures greater than 30 °C or below 20 °C may permanently change the certified rate.

CALIBRATION:

This device was individually calibrated by gravimetric determination of its weight loss at 25.0 °C. The device was held at this temperature for a period of not less than one year during which time measurements of weight were made.

Analytical comparisons of several devices of this SRM batch to primary gas standards and SRM's of tetrachloroethylene in nitrogen in compressed gas cylinders using gas chromatography with flame ionization detection did not reveal any systematic errors associated with the gravimetric calibration of this device.