

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 2661

Benzene on Charcoal

This Standard Reference Material (SRM) is intended primarily for use as an analytical standard for the determination of benzene vapor concentrations in the workplace atmosphere. The SRM consists of eight color-coded charcoal tubes, two each containing the indicated quantity of adsorbed benzene.

Tube		Amount of benzene per tube, mg	
Level	Color-code ^a	By preparation ^b	By analysis
I	red-red	0.014±0.001	(0.015±0.001)
II	red-blue	0.066±0.003	(0.068±0.002)
III	red-green	0.258±0.013	(0.264±0.010)
IV	red-black	0.994±0.030	(1.018±0.037)

^aThe tubes are identified by a two-dot color-code as follows: with charcoal section to right, the left dot indicates the solvent; the right indicates the amount.

^bCertified values.

The tubes were prepared by drawing through them a measured volume of air containing a known concentration of benzene, using the technique described in reference [1]. The certified values labeled "By preparation" are best estimates based upon these concentrations and volumes; the uncertainties represent our best estimate of inaccuracy inherent in the preparation procedure.

The values labeled "By analysis" are the averages obtained from measurements made on seven tubes at each concentration level to corroborate the certified values. The uncertainties represent the 95 percent tolerance limits, including measurement error and variability among samples [2]. These measurements were made using a modification of NIOSH Method No. P & CAM 127 [3]. The principal modification is that the entire charcoal contents, both front and backup sections, of each tube were eluted with one mL* of carbon disulfide and analyzed as a single sample [1].

The two sets of values are considered to be in agreement within the uncertainties assigned to each set.

*"The international symbol for liter is the lowercase 'l', which can easily be confused with the numeral '1'. Accordingly the symbol 'L' is recommended for United States use." Federal Register Vol. 41, No. 239, Dec. 10, 1976.

Washington, D.C. 20234
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J. Paul Cali, Chief
Office of Standard Reference Materials

(over)

Precaution:

Because of the possibility of migration of the solvent, during storage, from the adsorbing section to the backup section, the charcoal from both sections should be combined and analyzed as a single sample. One mL of carbon disulfide has been found to be a convenient volume of desorber for the analysis of the tubes.

The charcoal tubes were prepared and analyzed by B. C. Cadoff. The overall direction and coordination of the technical measurements leading to certification were under the chairmanship of J. K. Taylor. The statistical analysis was made by H. H. Ku.

The technical and support aspects involving certification and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by W. P. Reed and R. Alvarez.

References:

- [1] Cadoff, B. C., Hughes, E. E., Alvarez, R., and Taylor, J. K., "Preparation of Charcoal Sampling Tubes Containing Known Quantities of Adsorbed Solvents." NBSIR 74-530, July 1974.
- [2] Cali, J. P. et al., "The Role of Standard Reference Materials in Measurement Systems," NBS Monograph 148, 51 pages (Jan. 1975), p. 14.
- [3] "NIOSH Manual of Analytical Methods," U.S. Department of Health, Education, and Welfare, National Institute for Occupational Safety and Health.