



National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material 1828

Ethanol-Water Solutions

This Standard Reference Material (SRM) is intended primarily for use in the calibration of instruments and standardization of techniques for the determination of ethanol (ethyl alcohol) in breath and blood. It is also for use in the routine evaluation of the daily laboratory reference solutions used in these procedures.

SRM 1828 consists of five ampoules - one ampoule containing approximately 15 mL of ethanol-water azeotrope (95.629 weight percent ethanol); two ampoules each containing approximately 3 mL of the 0.2992 weight percent ethanol-water solution; and two ampoules, each containing approximately 3 mL of the 0.1487 weight percent ethanol-water solution. The certified values of the three ethanol-water solutions and the associated uncertainties are given below.

95.629 \pm 0.028 weight percent
0.2992 \pm 0.0016 weight percent
0.1487 \pm 0.0014 weight percent

The certified ethanol concentrations were calculated by dividing the mass of ethanol by the total mass of ethanol-water solutions. The concentrations were confirmed by gas chromatography (GC); the listed uncertainties are two standard deviations of the GC-determined concentrations of ethanol in individual ampoules.

To convert the certified concentrations in weight percent to mass percent of ethanol per volume of solution, multiply by the density of the solution at the desired temperature. For the azeotrope, the density of the solution at 22 °C was determined to be 0.8009 g/mL; for the other two solutions, the density of water can be used with an error of less than one part in a thousand. At 22 °C, the density of water is 0.9977 g/mL.

NOTICE AND WARNINGS TO USERS

Expiration of Certification: This certification is valid within the specified uncertainty limits for two years from the date of shipment from NIST. Should the certification become invalid before then, purchasers will be notified by NIST.

Storage: Sealed ampoules, as received, should be stored in the dark at temperatures between 10 to 30 °C.

Use: Solutions should be used immediately after opening ampoules to avoid possible change in the certified concentration. This is particularly important for the 0.15 and 0.30% solutions.

Analyses of the ethanol-water solutions were performed by F.R. Guenther and S.N. Chesler; the density of the azeotrope was determined by L. Sniegowski of the NIST Organic Analytical Research Division. The overall direction and coordination of technical measurements leading to the certification were performed by S.N. Chesler of the NIST Organic Analytical Research Division.

Consultation on the statistical design of the experimental work and evaluation of data was provided by R.Paule.

Gaithersburg, MD 20899
March 19, 1993
(Revision of certificate dated 6-11-85)

William P. Reed, Chief
Standard Reference Materials Program

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The technical and support aspects concerning the revision, update, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by J.C. Colbert.

Preparation and Analysis: The three ethanol solutions were prepared in a *PTFE bag. The components were transferred under nitrogen, weighed in the collapsed bag, and stirred for 24 h at 4 °C. Each solution was ampouled in a manner to ensure constancy of composition from start to finish. As the solution was ampouled, the bag was maintained in a collapsed state to prevent the formation of a headspace.

Randomly selected ampoules of the three solutions comprising the SRM were analyzed by GC using methanol as an internal standard. In the analysis, a glass analytical column, 2 m long x 2 mm internal diameter, and packed with *Chromasorb 107, was used. A thermal conductivity detector was used in the analysis of the azeotrope; and a flame ionization detector, for the 0.15 and 0.30% solutions.

For each of the three ethanol solutions, the average of the GC results agreed with the calculated gravimetric concentration.

*Certain commercial equipment, instruments, or materials are identified on this certificate to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.