J Forensic Sci, Jul. 1975, Vol. 20, No. 3

TECHNICAL NOTE

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Stability of Aqueous Ethanol Solutions Stored in Glass Ampules

During our work on the development of performance standards for breath alcohol analyzers [*1*], it was necessary to prepare known concentrations of ethanol in distilled water for the purpose of measuring the performance capabilities of such instruments. In these studies we were concerned with the preservation of our reference ethanol solutions. For this reason we prepared a solution of known ethanol concentration and stored it in a number of flame-sealed, glass ampules. Some questions have been raised concerning the stability of ethanol solutions when stored in this manner [*2*]. We have measured the ethanol concentration by dichromate oxidimetry over a period of two years, and the results are reported in this paper.

Experimental

A stock ethanol solution was prepared using commercially available 95% ethanol and distilled water. The ethanol concentration of this solution as determined by weight was 60.17 mg/ml, using measured densities of 0.8067 g/ml at 25 °C for the 95% ethanol and 0.9853 g/ml at 25 °C for the stock ethanol solution. The density table of Osborne et al [*3*] was used to obtain percentage ethanol by weight from the measured density. The glass ampules (10-ml capacity) were pretreated by washing in boiling water in a laboratory washer, rinsed several times with distilled water, and then dried in an oven at 110 °C. Using an automatic filling and sealing machine, 5.0-ml volumes were dispensed into the glass ampules which were then flame sealed. The potassium dichromate used in this analysis was National Bureau of Standards SRM 136 and all other reagents were of analytical reagent grade. The analytical procedure employed was adapted from a method by Willard et al [*4*].

Results and Discussion

The results of the ethanol determinations performed over a two-year period are shown in Table 1. The results indicate that aqueous ethanol solutions can be maintained in

Received for publication 10 Sept. 1974; accepted for publication 20 Nov. 1974.

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TABLE 1—*Measured ethanol concentration (gravimetric value 60.17 mg/ml), mg/ml.*

	21 Feb. 1972	5 July 1972	10 May 1974
	60.11	60.50	60.42
	59.99	60.12	60.40
	60.12	60.27	60.60
	59.94	60.27	60.65
Mean	60.04	60.29	60.51
s^a	0.09	0.16	0.13

[a]Standard deviation of a single measurement.

flame-sealed ampules without any significant change in ethanol concentration. Reference ethanol solutions stored in this manner appear to be excellent for ensuring long-term stability.

References

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