

Quantitative Determination of Sympathomimetic Amines Using Interference Refractometer

Sir:

Interference refractometry, the phenomenon of light interference which is used to measure differences in the refractive index of liquids (and gases), has been used as a means for quantitative analysis of solutions, and a method for the determination of concentration of protein in blood serum has been established (1) using this technique.

In the present investigation, quantitative determination of some sympathomimetic amines has been carried out using a Carl Zeiss laboratory interferometer and a 80-mm. cell.

Very dilute solutions of the amines in various solvents were prepared, and the measuring process followed directly after the determination of the zero point in the instrument. This means that the zero point must be determined at the beginning of the experiment and before each individual series. For this purpose the solvent to be used for the solution under measurement is placed in the twin-cell, and the zero reading is taken. The reference substance is then removed from one half of the cell and the test sample is poured into it and allowed to stand until the temperature has become equalized (approximately 20 min.), because at this stage only the lower interference band can be seen, the upper band of the band system having been displaced laterally due to the filling cell.

The actual measurement process is to determine the amount of this displacement. The reading, less the zero point reading, is the required result.

The purity of the amines used was detected, before use, by thin-layer chromatography, melting point determination, and infrared spectra analysis.

Using solutions of amphetamine sulfate (National Biochemical Corp.) in water, a linear relationship between the various solutions of the amine and the interference refractive index was observed, and this relationship was found to be concentration dependent (Fig. 1). An unknown amount of the amine, measured under the same conditions, can be then estimated.

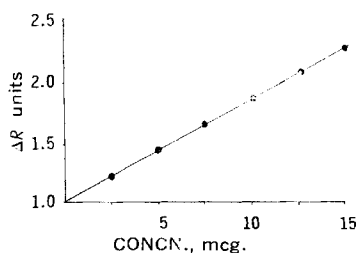


Fig. 1—Relation between differential refractive index (ΔR) and concentration for amphetamine sulfate in water solution.

Similar results were obtained using aqueous solutions of nordefrin hydrochloride (Mann Research Laboratories, Inc.) and phenylephrine hydrochloride (K & K Laboratories, Inc.).

Due to the high precision of the instrument (with monochromatic light, an accuracy of $\pm 1 \times 10^{-7}$ to $\pm 1 \times 10^{-8}$ can be obtained), the method is regarded as being very accurate even for microgram quantities of the amines.

A complete picture of the results, including all amines and solvents used, and a full discussion of the method will be cited in a definite publication.

(1) Hirsch, P., "Handbook der Biologischen Arbeitsmethoden," 1926, p. 761.

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