

CHROM. 6173

Simple procedure for cleaning Teflon coils in amino acid analyzers

The deposition of insoluble material within the flow lines of automated amino acid analyzers has been discussed previously^{1,2} and a device for cleaning contaminated coils has been described³. This device, which is somewhat complex in construction and made of expensive material, is charged with dichromate solution and a pump used to force the solution through the coil. The present communication describes the use of a considerably simpler procedure for the removal of such deposits from amino acid analyzer flow lines.

The construction of a glass tube that could serve as a reservoir for cleaning solutions has been described³ or, if preferred, a chromatographic tube 0.9×23 cm (32787) can be obtained from Beckman Spinco Division, along with a lower column fitting (330047). When required for coil cleaning the tube with fitting 330047 is located alongside the analyzer short column. The latter is sealed off at the ball joint fitting with a socket connection plug and the flow-line socket attachment is clamped to the cleaning reservoir tube. After the lower colorimeter attachment has been disconnected, the colorimeter is sealed off with another socket plug, and the exit flow-line from the coil placed in a beaker. The reservoir tube is filled with cleaning solution and the selector slide valve that controls the direction of flow is turned to coil. A nitrogen pressure line is connected to the top of the tube and a pressure of approximately 6 lbs./in.² is used to force the cleaning solution through the coil. After the tube is recharged three times with deionized water, which is passed through the coil, the tube is disconnected. The analyzer short column is now reconnected and the buffer pump is used to complete the flushing-out of the coil. The coil cleaning procedure was carried out on a Beckman Unichrom amino acid analyzer.

In the above procedure, which was used for slightly contaminated coils, the cleaning solution used was either "Detex-11"[®] (Borer Chemie, Solothurn, Switzerland) or "RBS-25"[®] concentrate (Chemical Products, R. Borghraef, Belgium). Heavily contaminated coils were removed from the analyzer and a solution of 0.5 ml of hydrogen peroxide in 9.5 ml of formic acid (99%) was allowed to flow slowly through the coil under gravity feed, a water pump vacuum line being used to start the flow.

Discussion

The accumulation of solid material in the Teflon reaction bath coil can be caused by leakage of ninhydrin reagent into the coil under gravity feed during the period of analyzer shut-down. This leakage can readily occur on amino acid analyzers when the glass wool is left out of the filter tube or is too lightly packed. A precipitate can also form as a result of incomplete removal of the reagent at the termination of an analysis. Subsequent analyses, especially on high-sensitivity settings, will suffer from an erratic recorder baseline trace owing to flakes of deposit flowing through the colorimeter cuvette. Also, the presence of precipitate is accompanied by a very darkly coloured solution, the passage of which through the colori-

Cleaning the coil by using the simple procedures described above markedly improved recorder baseline stability. The hydrogen peroxide-formic acid solution was found to be very effective in removing heavy deposits and is easier to prepare than dichromate solution. For the removal of light deposits, however, the use of Detex-II or RBS-25 concentrate has definite advantages. Among these are: (a) handling is not so hazardous, (b) the coil can be cleaned *in situ*, and (c) no prior preparation before use is required.

Finally, unless amino acid analyzers are manufactured with automatic change-over valves to remove the ninhydrin reservoir flow-line from direct entry into coil at the commencement (or termination) of the flush cycle, coil contamination, with consequent baseline instability, can occur. Routine purging of the coil with a cleaning solution such as Detex-II by the simple procedure described here should avoid the occurrence of these difficulties.

The author wishes to thank Mrs. NANCY ALDRICH for skilled technical assistance.

*Department of Biochemistry,
John Curtin School of Medical Research,
Australian National University,
P.O. Box 334, Canberra, A.C.T. 2601 (Australia)*

L. B. JAMES

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Received May 29th, 1972

J. Chromatogr., 71 (1972) 159-160