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Note

Gas chromatography of higher polyamines on Tenax-GC columns

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In this journal Casselman and Bannard¹ have reported the separation of polyamine mixtures by gas chromatography using three polymer packings. Specifically, aliphatic amines up to but not including tetraethylenepentamine (TEPA) were separated without the problems associated with coated diatomaceous earths and PTFE packings. However, TEPA was not eluted from those workers' columns of Porapak Q, Porapak Q impregnated with KOH, and Chromosorb 103.

This note reports the successful elution of TEPA and the resolution of several components in samples of TEPA and triethylenetetramine (TETA) using the chromatographic packing Tenax-GC, a porous polymer based on 2,6-diphenyl-*p*-phenylene oxide developed by Van Wijk².

EXPERIMENTAL

Tenax-GC, 60-80 mesh (Applied Science Labs., State College, Pa., U.S.A.), was packed by conventional means into a 5-ft. length of 1/8-in.-O.D. (0.055-in.-I.D.) stainless-steel tubing. The column was coiled and installed in a Model 1520 flame ionization chromatograph (Varian, Walnut Creek, Calif., U.S.A.) with one end of the column fitted within the injector to allow for on-column injection. Injector and detector temperatures were maintained at 300° and the carrier gas (helium) at 50 ml/min. The polyamines TEPA and TETA were obtained from Dow Chemical (Midland, Mich., U.S.A.).

RESULTS AND DISCUSSION

A chromatogram (Fig. 1) of TEPA obtained by temperature programming showed several peaks which are thought to be position isomers³. Similar results were obtained for TETA without overlapping of any of the major peaks' retention times in the two chromatograms.

At higher temperatures and under isothermal conditions, TEPA and TETA gave individual sharp peaks which may exhibit only very small skewness similar to that obtained by Casselman and Bannard for later eluting polyamines.

Even when the temperature program was extended to 350° there was no column bleed detected under the most sensitive detector conditions.

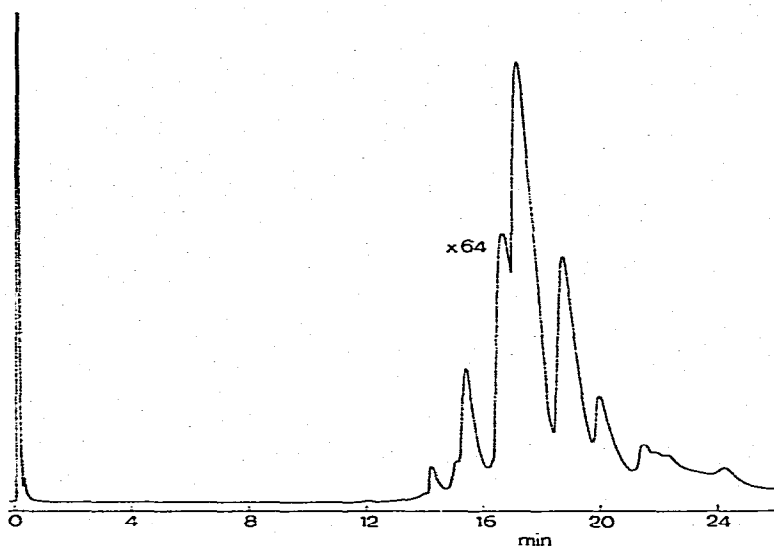


Fig. 1. Temperature-programmed chromatogram of TEPA. Injection, 1 μ l of a 10% solution. Temperature program, 10°/min for 13 min, then 6°/min to 300°.

Tenax-GC offers a thermally stable column for gas chromatographic separation of higher polyamines and also may be used to examine and compare individual polyamines.

REFERENCES

- 1 A. A. Casselman and R. A. B. Bannard, *J. Chromatogr.*, **88** (1974) 33.
- 2 R. van Wijk, *J. Chromatogr. Sci.*, **8** (1970) 418.
- 3 L. Bergstedt and G. Widmark, *Acta Chem. Scand.*, **24** (1970) 2713.