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A NEW ELUANT FOR THE SEPARATION OF
THE ACTINIDE ELEMENTS

G. R. Choppin, B. G. Harvey, and S. G. Thompson

May 17, 1955

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**A New Eluant for the Separation of
the Actinide Elements**

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May 17, 1955

Several groups have described the use of ammonium lactate solutions as the eluting agent for the separation of the actinide and the lanthanide elements from cation resin columns.¹⁻⁵ A new eluant, ammonium α -hydroxy-isobutyrate has given much better separations than ammonium lactate for both of these groups of elements. This eluting agent was used in the recent separation and identification of mendelevium, element 101.⁶ A typical elution curve for the actinide elements is shown in Fig. 1.

The experimental conditions are identical to those reported by this laboratory for the use of ammonium lactate.⁴ A curve of pH vs elution peak position drop number for a 0.4 M ammonium α -hydroxy-isobutyrate solution with a 5 cm x 2 mm Dowex-50 X-12 cation resin column operated at 87° C is shown in Fig. 2. Table I is a comparison of ammonium glycolate, ammonium lactate and ammonium α -hydroxy-isobutyrate in which elution peak positions are expressed relative to curium by a separation factor, α , with the free column volume subtracted from all peak positions. Elutions of lanthanide tracers showed that the separations relative to gadolinium are approximately the same as those for the analogous actinides relative to curium. This is the same behavior as that exhibited by ammonium lactate, ammonium citrate and similar eluants.*

The improvement in separations attendant to the replacement of a hydrogen by a methyl group on the alpha carbon is evident. A more complete investigation of these and similar complexing agents is in progress.

The assistance of Margaret Nervik and Roberta Garrett in the column runs is gratefully acknowledged.

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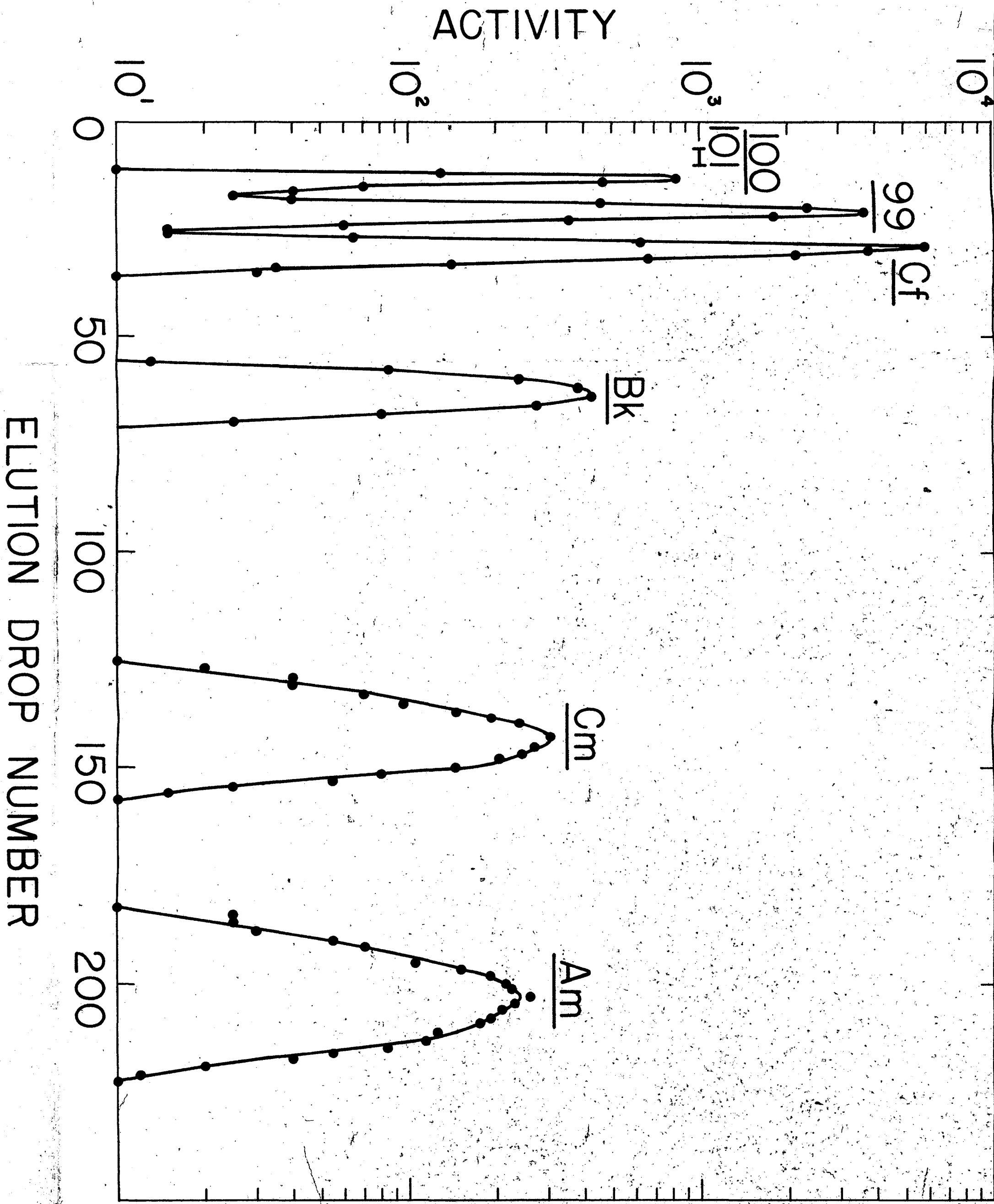
*We are grateful to Dr. E. C. Freiling for pointing out that our earlier report (reference 4) on ammonium lactate may have been misleading on the positions of the lanthanides and the actinides relative to each other. With ammonium α -hydroxy-isobutyrate as with ammonium lactate, promethium and americium elute approximately together.

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2. S. W. Mayer and E. C. Freiling, *J. Am. Chem. Soc.* 75, 5647 (1953).
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5. R. A. Glass, *J. Am. Chem. Soc.* 77, 807 (1955).
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Table I

Eluant Anion

Element	Glycolate	Lactate	α -Hydroxy- isobutyrate
Mv	--	--	0.05
100	--	0.23	0.07
99	--	0.33	0.13
Cf	0.60	0.41	0.20
Bk	0.70	0.65	0.45
Cm	1.00	1.00	1.00
Am	1.14	1.21	1.45



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