

Results of the Chemical Separations

The behavior of the new 45-minute activity in the ion exchange procedures used in its separation are highly significant for the assignment of the atomic number 98. Fig. 3 shows the results of one of the separations in the first resin column after which the  $\text{Cm}^{242}$  present in the element-98-containing fractions was reduced to approximately  $10^5$  alpha-disintegrations per minute. The results of one of the separations in the second resin column are shown in Fig. 4. In this case the position of the 45-minute radioactivity is shown relative to berkelium, curium, and yttrium. The alpha-radioactivity was measured in all cases except that of the fission product yttrium, whose beta-radioactivity was measured. These results might be summarized in the statement that element 98 is eluted in the expected eka-dysprosium position preceding berkelium from the resin column.

A region of particular importance is illustrated in Fig. 5, which compares the elution positions of the actinide group element 98-berkelium-curium-ameridium with the homologous lanthanide group dysprosium-terbium-gadolinium-europium. The comparison is based in part on a number of separate experiments performed under as nearly identical conditions as possible. The ordinates are normalized to show equal amounts. These particular results might be summarized as follows: the difference in rates of elution between element 98 and berkelium as compared with the difference between berkelium and curium is remarkably similar to the spacing dysprosium-terbium and terbium-gadolinium. There is a remarkable similarity in the spacing of the four members of each group; with breaks at the points of half-filling of the f electron shells, gadolinium and curium; the spacings here reflect the relative changes in ionic radii which determine the relative separations in the ion exchange adsorption method.

With regard to the group separation of actinides from rare earths using the Dowex-50 resin column with 13M hydrochloric acid,<sup>5</sup> the new 45-minute activity was