(atomic number 96) are reached, the (III) state is the predominant one, and, in fact, seems to be the only state of these latter elements which is thermodynamically stable in acidic aqueous solution. In the cases of berkelium (atomic number 97) and californium (atomic number 98) only tracer experiments have been done and, therefore, the information is less certain. These experiments show that berkelium exhibits stable (III) and (IV) oxidation states (31) and indicate that californium exists solely in the (III) state (32), which behavior is in entire conformity with their expected analogy with their rare earth homologues, terbium and dysprosium, respectively.

Perhaps the most striking chemical evidence as to the course taken in the filling of the 5f electron shell in this region is that offered by the work on the separation of the tripositive actinides and lanthanides by the ion exchange column method. The use of a cation exchange resin with an eluting agent such as ammonium citrate solution, as developed on the Plutonium Project (33), has led to a satisfactory solution of the difficult problem of separating in pure form the rare earth elements from each other. The tripositive actinide elements are equally difficult to separate from each other and from the rare earths because of their great similarity to the latter. However, the analogy in behavior of the actinide and lanthanide elements here is much greater than results from a similarity in the difficulty of separation, as can be seen from the following slide (Figure 18). The simplicity of the apparatus used is illustrated in the next slide (Figure 19).

A remarkable analogy in the spacing can be seen between the group californium-berkelium-curium-americium and their rare earth homologues