

The Synthetic Routes to Some 92-173th Elements

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Abstract

In our previous paper, we gave the synthetic routes to the 119-128th elements. In this paper, we give the synthetic routes to some key elements from the 92th to the 173th. The 137th element could be called the Feynman end of the elements, and 173th element could be called the Dirac end of the elements, so the main aim of this work is to explore the frontier of the elements. In addition, we also illustrate a “bridge-correlation effect” in nuclides.

Keywords: synthetic routes, frontier of the elements, bridge-correlation effect.

1. Introduction

R. Feynman deduced that the atomic number of the hydrogen-like atom couldn't be more than 137 according to Bohr model, otherwise the speed of the ground state electron in the atom would exceed the speed of the light in vacuum, so he supposed that the end of the elements would be the 137th element which is called Feynmanium (Fy). By more detailed calculation with Dirac equation and considering the volume of the atomic nucleus, the end of the elements should be the 173th element, which should be called the Dirac end of elements. Now there are 118 elements in the periodic table of elements which fill in the whole 7 periods of elements. So to predict the 119-173th elements and design their synthetic routes should be serious theoretical and experimental problems of physics.

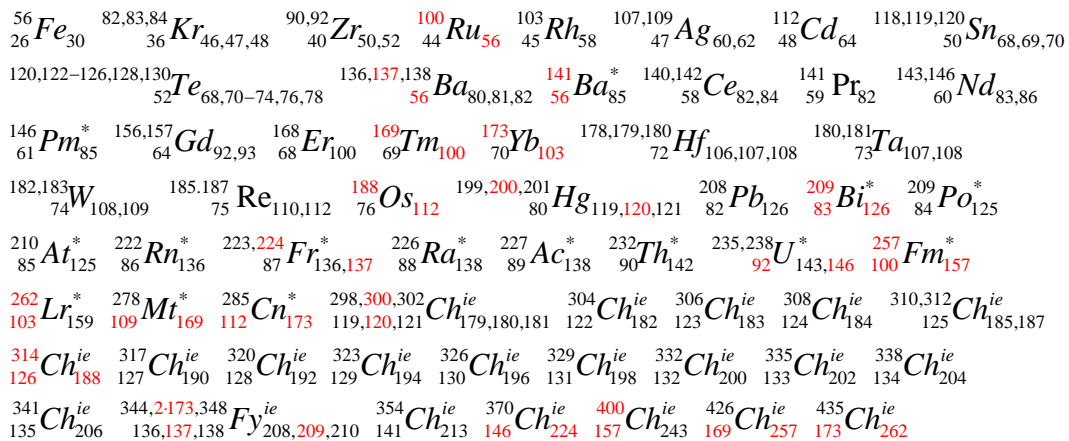
In our previous papers [1-14], we predicted the 119-173th elements which we called the ideal extended elements (*ie*), and in a recent paper [13] we designed the synthetic routes to the 119-128th elements. In this paper, we design the synthetic routes to

element 92, 94, 100, 103, 109, 112, 119, 120, 121, 125, 126, 130, 132, 136, 137, 138, 141, 146, 157, 168, 169 and 173. It is worthy to note that the numbers 137, 141, 157 and 173 correspond to the fine-structure constant, the square root of 2, $\pi/2$ and the square root of 3 respectively especially in the world of nuclides or the sub-atomic world, and there is formula “ $141/2 + 173/2 = 157$ ” or the three numbers 141, 157 and 173 are in arithmetic progression. The number 146 is also special because the most stable isotope of Uranium with 146 neutrons in its atomic nucleus and it is predicted by us that the 146th ideal extended element should have 224 neutrons. 136 and 138 could be called brother numbers of 137, or all of them could be called the numbers of the fine-structure constant, because even numbers 136 and 138 are usually more stable numbers than 137 in nuclides but have the same effect as 137.

2. Bridge-correlation Effect in Nuclides

Another reason to select the above-stated elements to design their synthetic routes is illustrated by a kind of “bridge-correlation effect” as follows.

Bridge-correlation Effect in Nuclides:

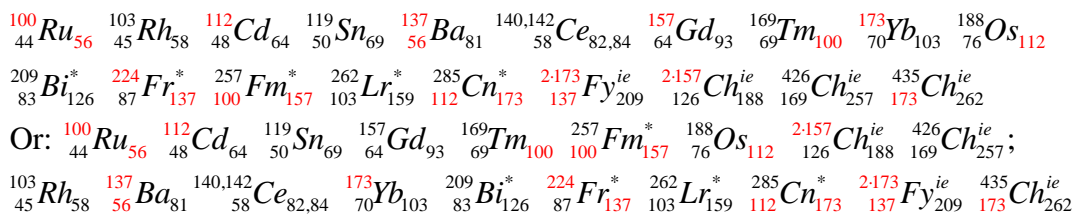


Note: $112 = 2 \cdot 56$, $224 = 2 \cdot 112$; $141 = 3 \cdot 47$, $188 = 4 \cdot 47$, $235 = 5 \cdot 47$;

$136 = 8 \cdot 17$, $138 = 6 \cdot 23$, $68 = 4 \cdot 17$, $69 = 3 \cdot 23$, $238 = 14 \cdot 17$;

$141 + 173 = 314$, $314 = 2 \cdot 157$, $346 = 2 \cdot 173$

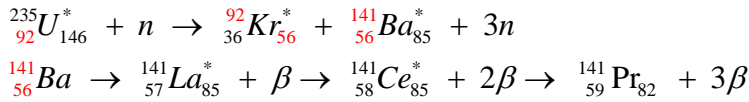
More simple and typical examples of bridge-correlation effect are as follows:



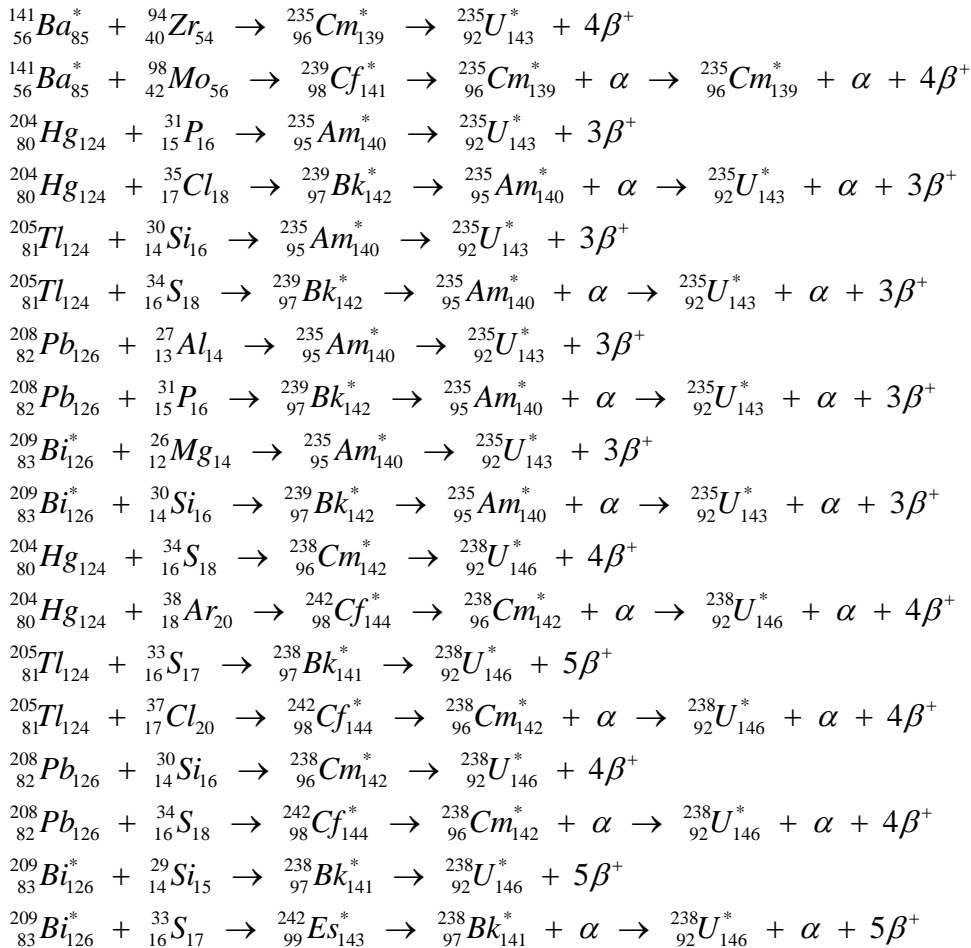
It seems that there is a “bridge-correlation effect” in nuclides with which some key numbers of nucleon of a former nuclide will act as a “bridge” for a later corresponding nuclide. And in the above elements, i.e., element 92, 94, 100, 103, 109, 112, 120, 125, 126, 128, 130, 132, 136, 137, 138, 141, 146, 157, 168, 169 and 173, have more critical “bridge-correlation effect” and act as “skeleton” of the all elements.

3. The Synthetic Routes to Element 92, 94, 100, 103, 109, 119, 120, 121, 125, 126, 128, 130, 132, 136, 137, 138, 141, 146, 157, 168, 169 and 173

Preparation of the key starting nuclide $^{141}_{56}\text{Ba}^*$ (half life 18.27min):

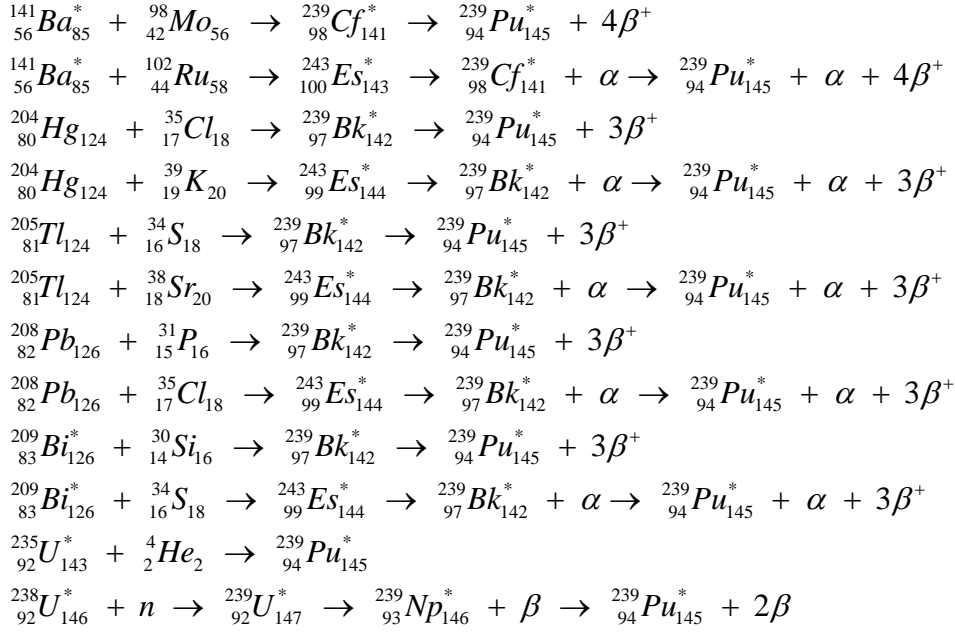


The Synthetic Routes to the 92th Element:

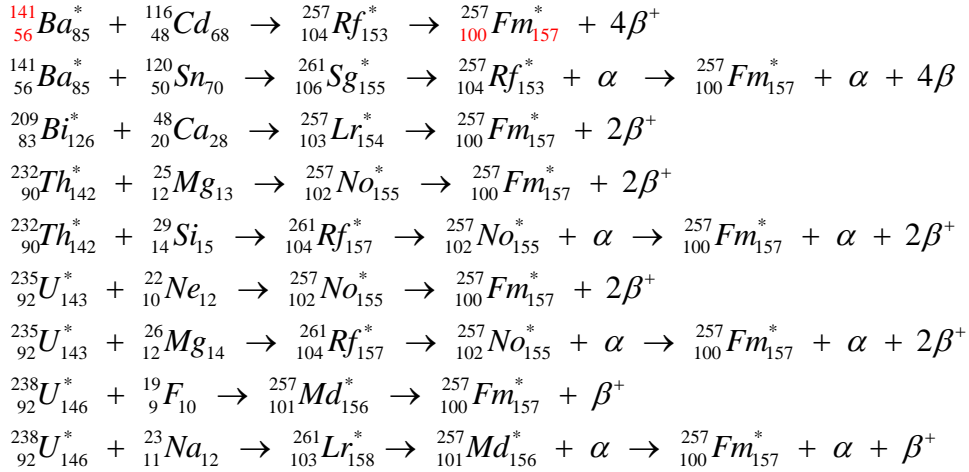


The Synthetic Routes to the 94th Element Pu239:

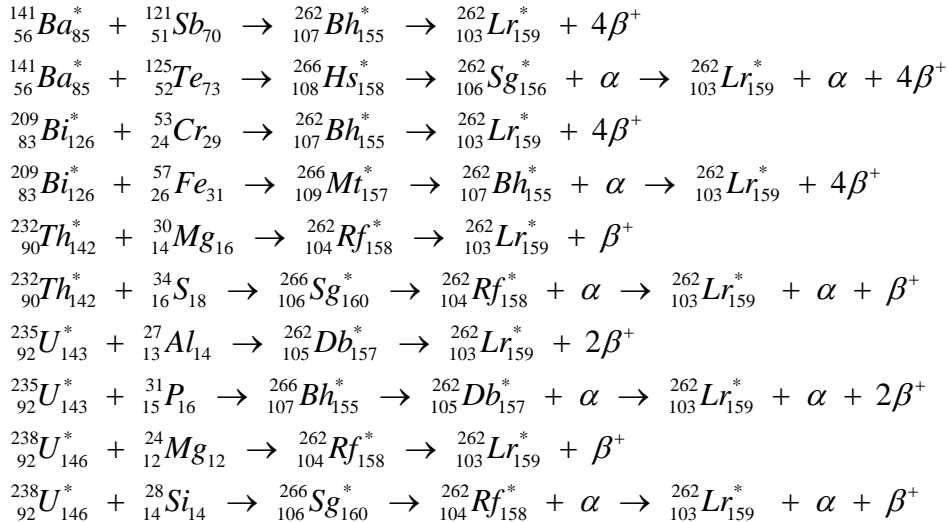
$^{239}_{94}\text{Pu}^*_{145}$ is fissionable, so it is worthy to synthesized it.



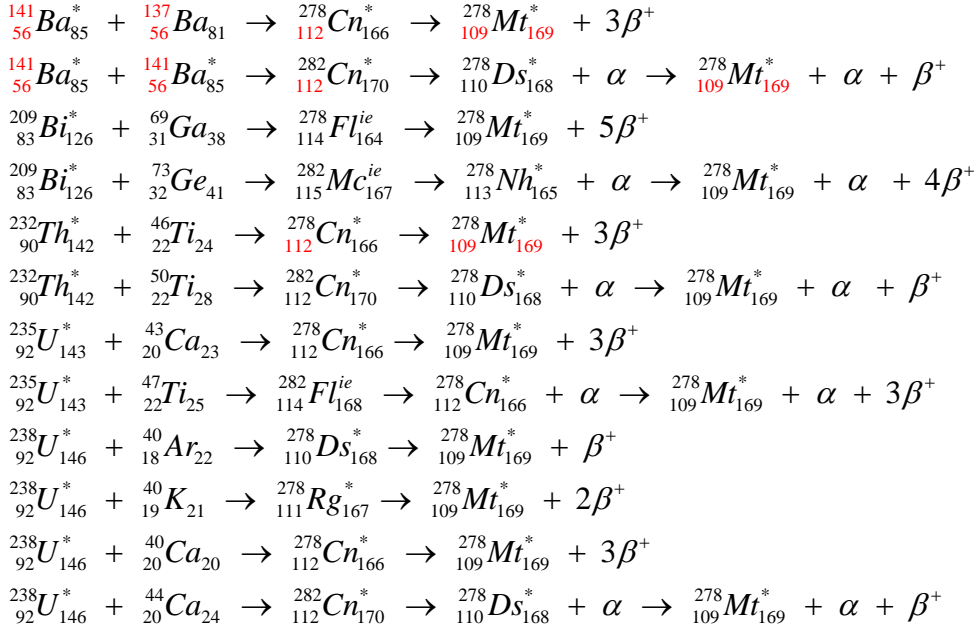
The Synthetic Routes to the 100th Element:



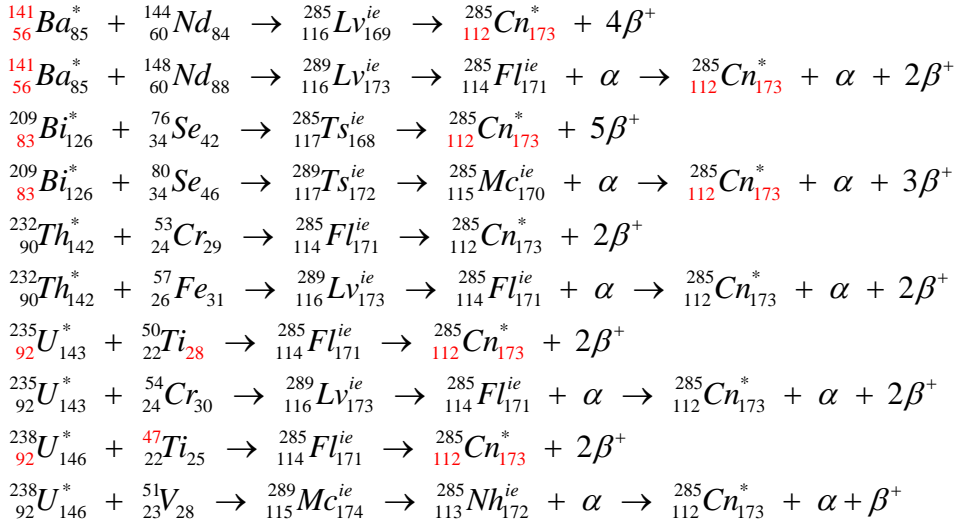
The Synthetic Routes to the 103rd Element:



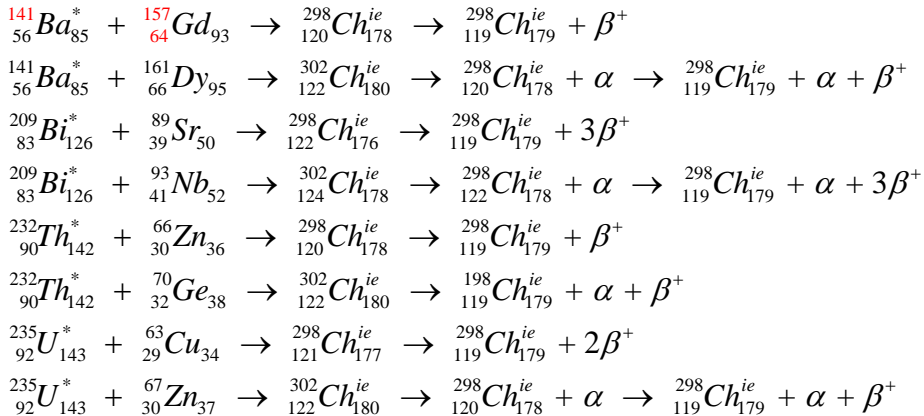
The Synthetic Routes to the 109th Element:

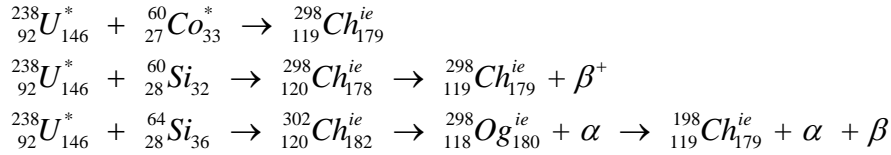


The Synthetic Routes to the 112th Element:

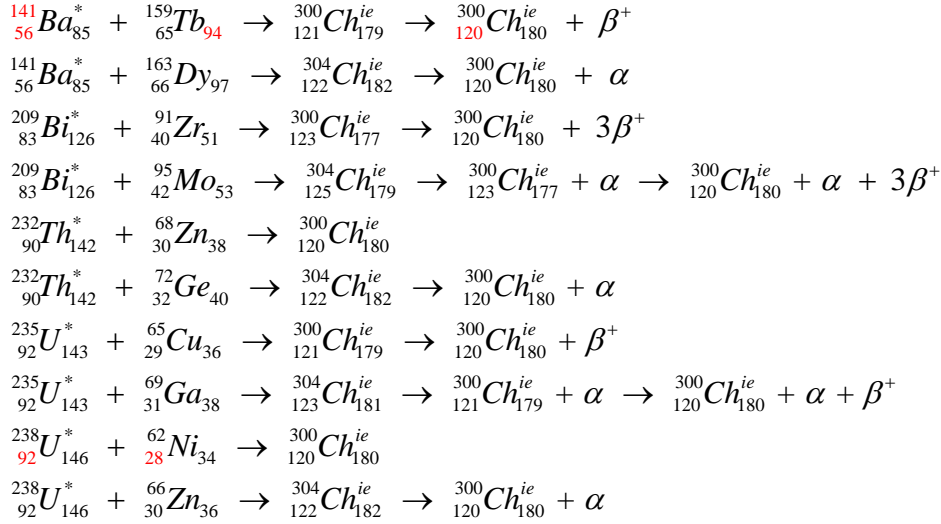


The Synthetic Routes to the 119th Element:

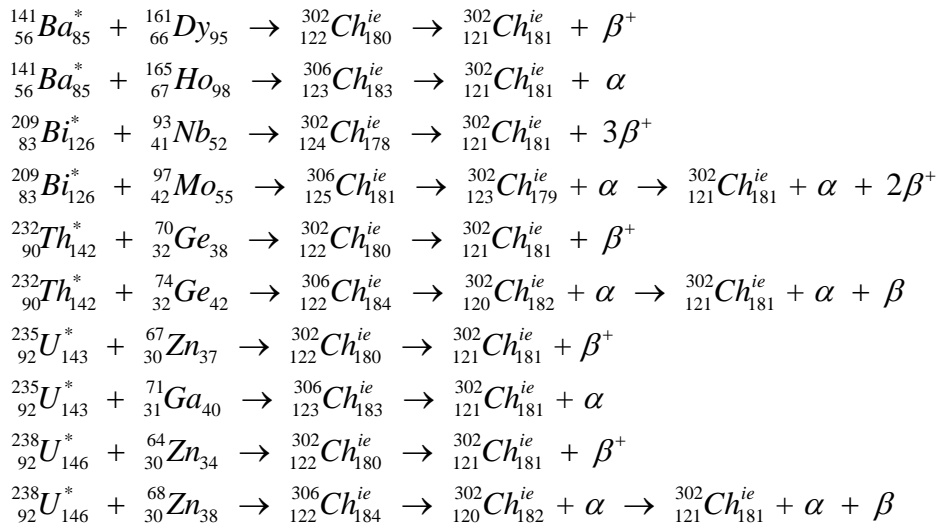




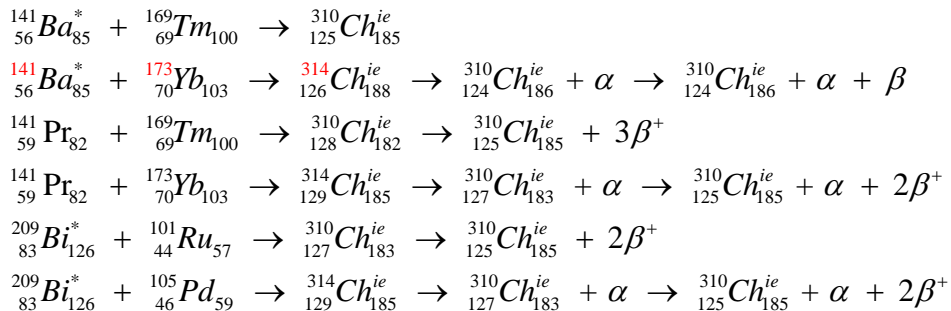
The Synthetic Routes to the 120th Element:

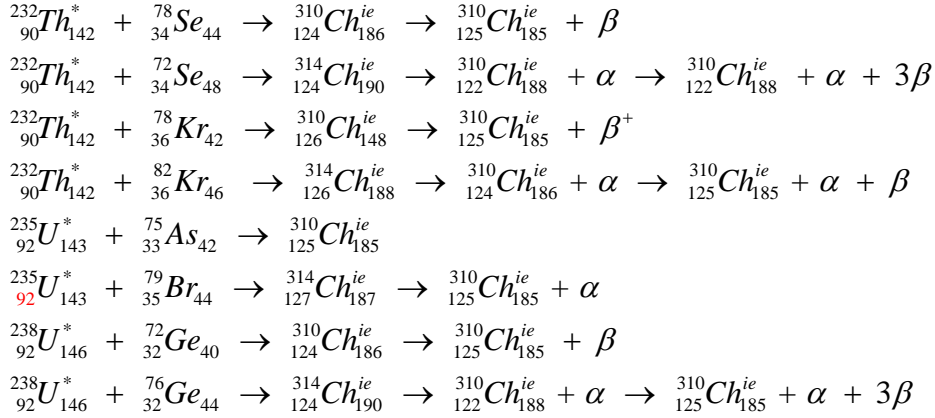


The Synthetic Routes to the 121th Element:

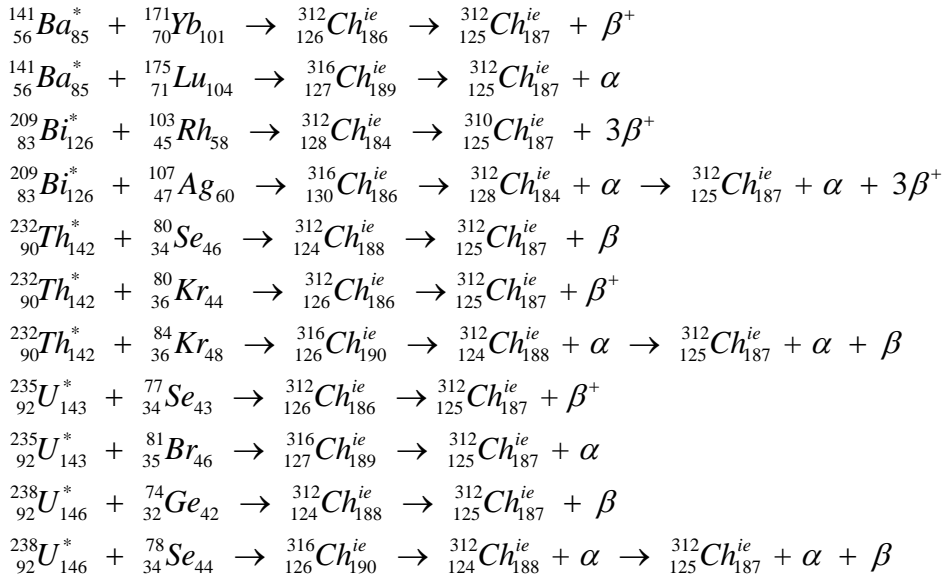


The Synthetic Routes to the 125th Element 125Ch310:

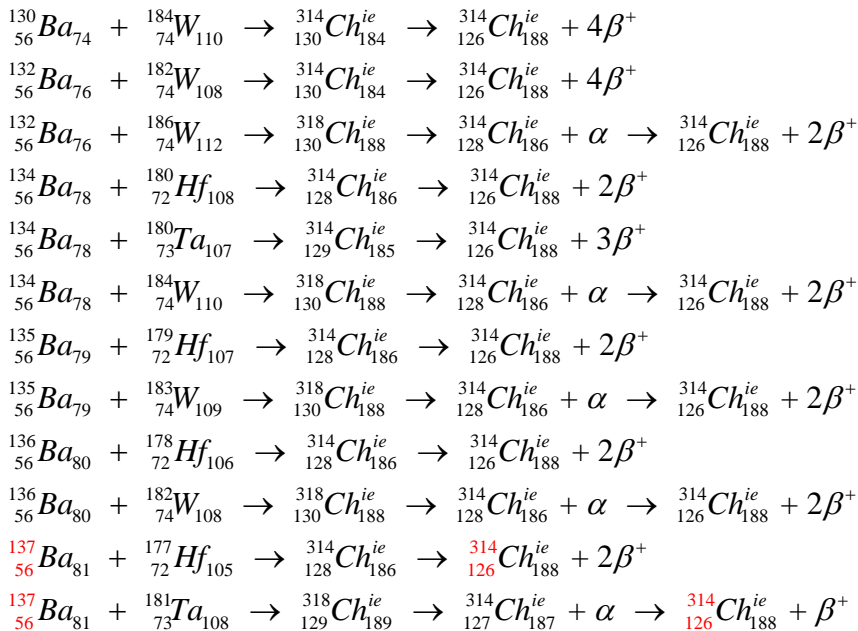


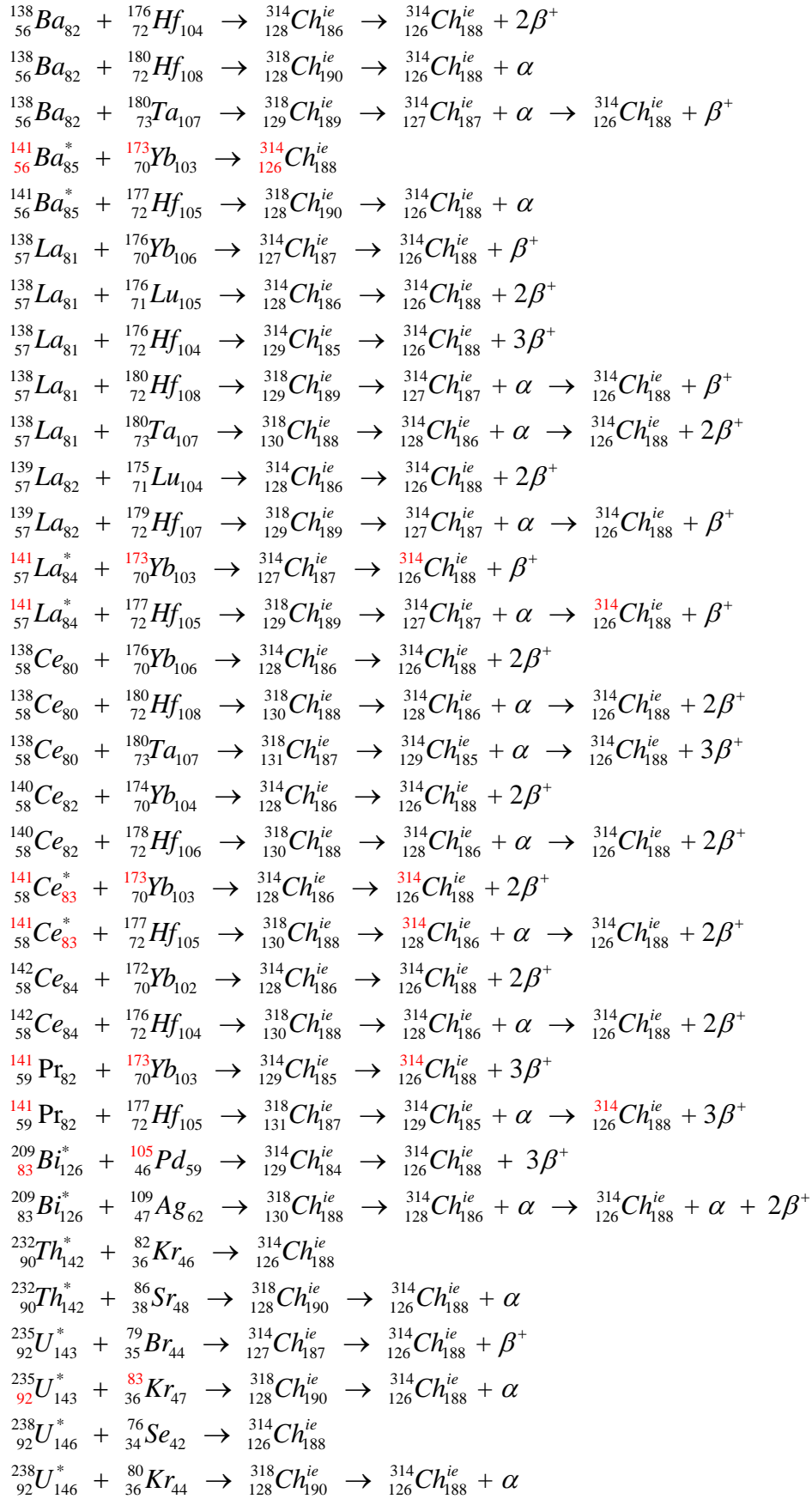


The Synthetic Routes to the 125th Element $^{125}\text{Ch}_{312}$:

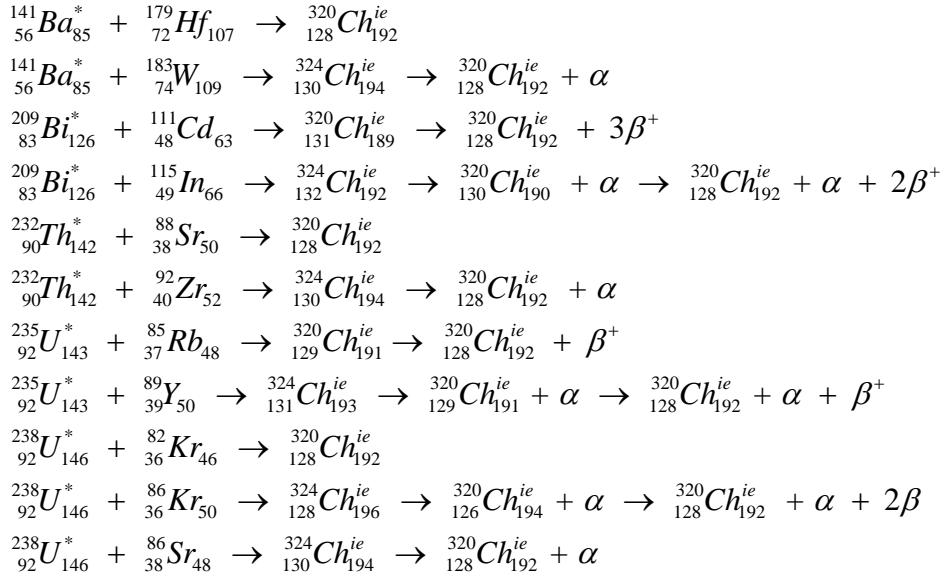


The Synthetic Routes to the 126th Element:

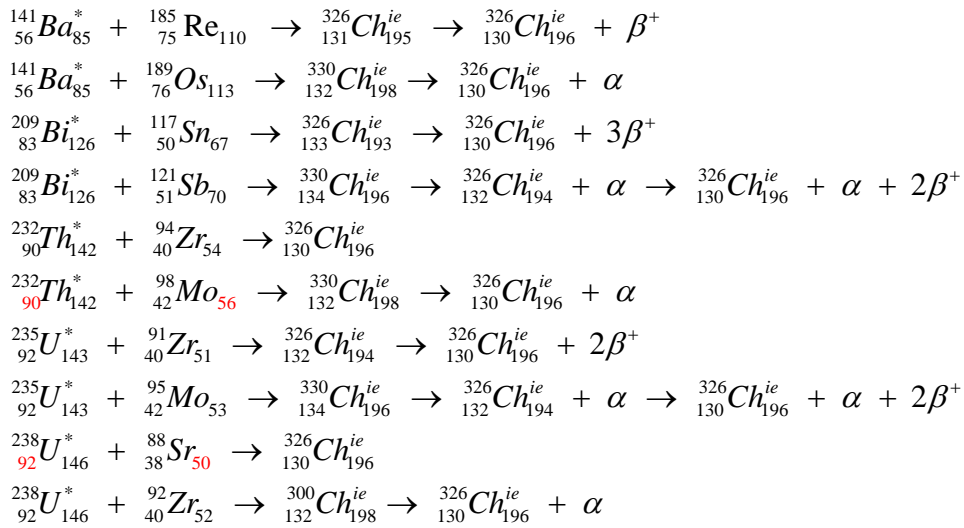




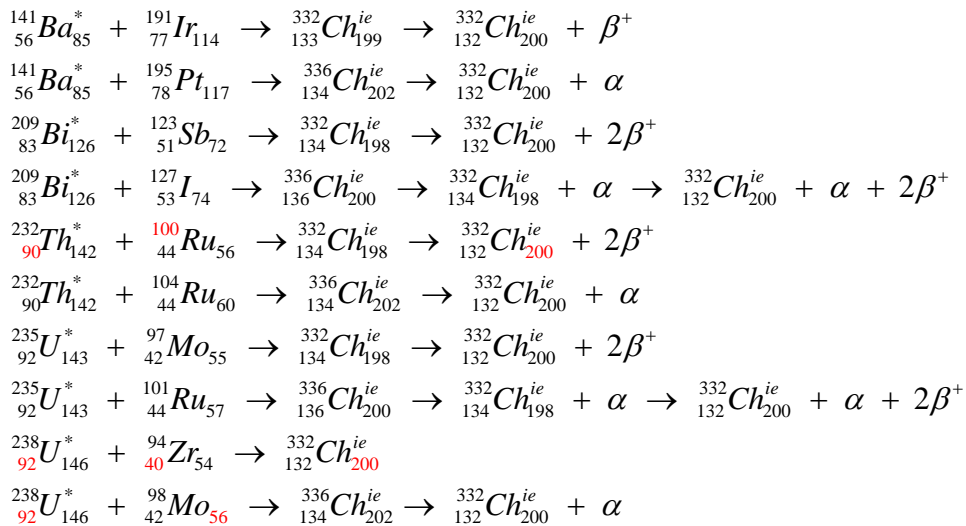
The Synthetic Routes to the 128th Element:



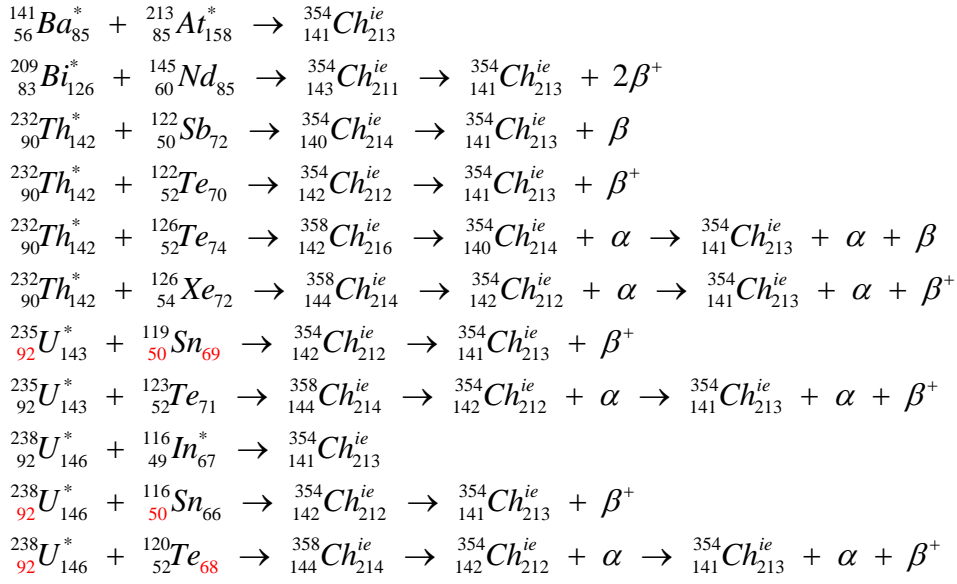
The Synthetic Routes to the 130th Element:



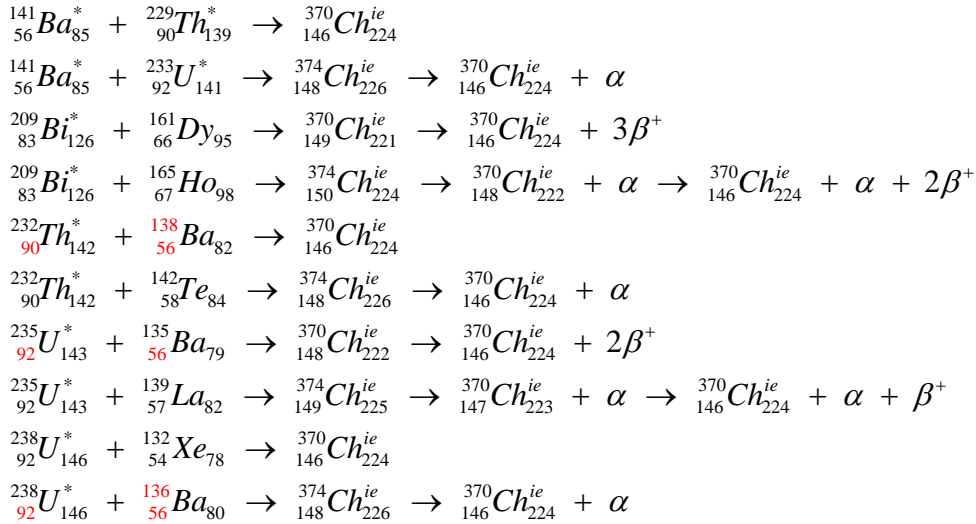
The Synthetic Routes to the 132th Element:



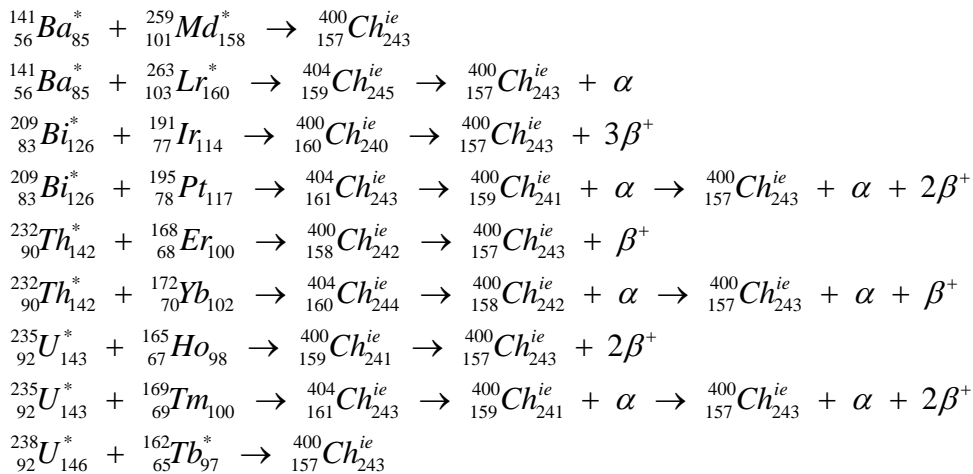
The Synthetic Routes to the 141th Element:

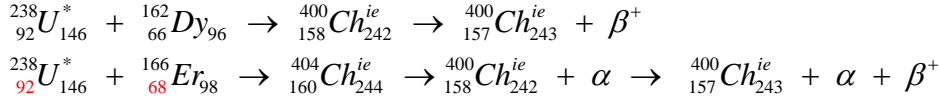


The Synthetic Routes to the 146th Element:

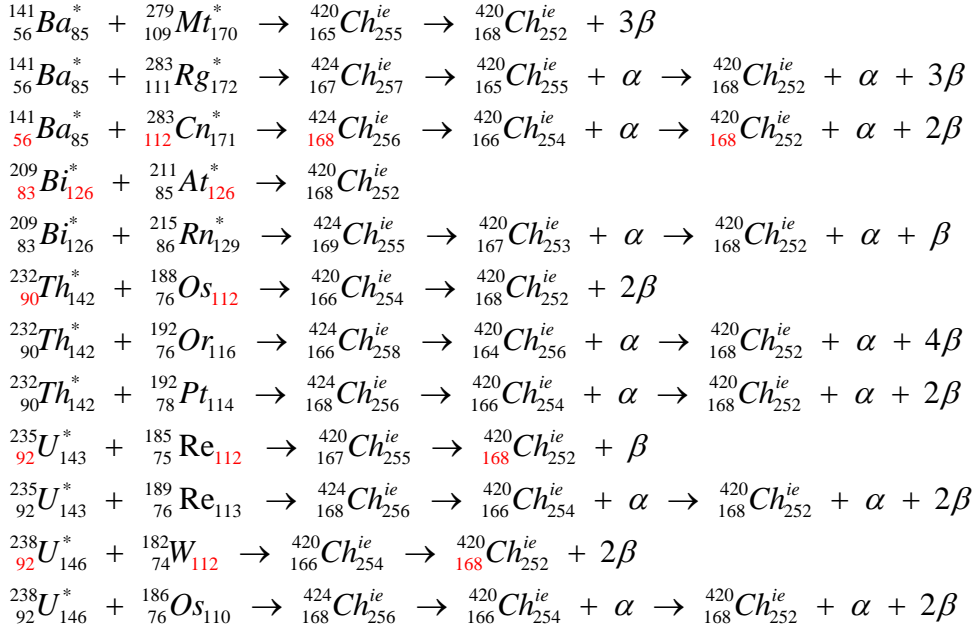


The Synthetic Routes to the 157th Element:

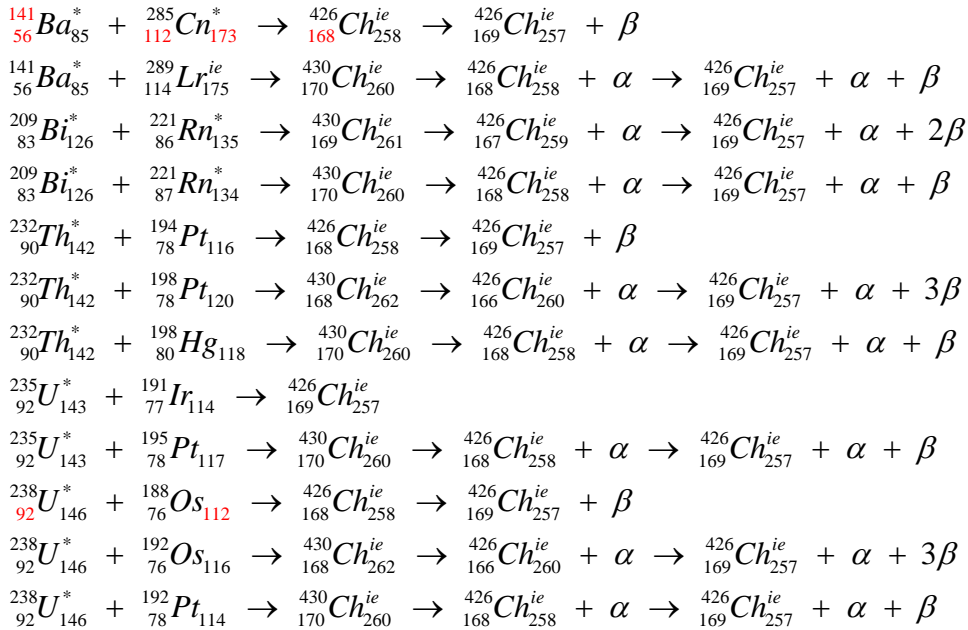




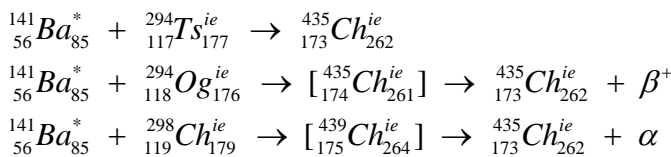
The Synthetic Routes to the 168th Element:

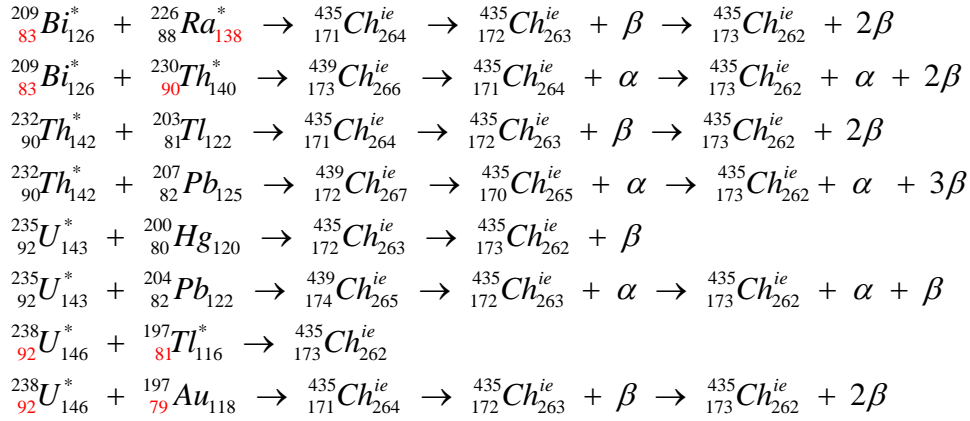


The Synthetic Routes to the 169th Element:



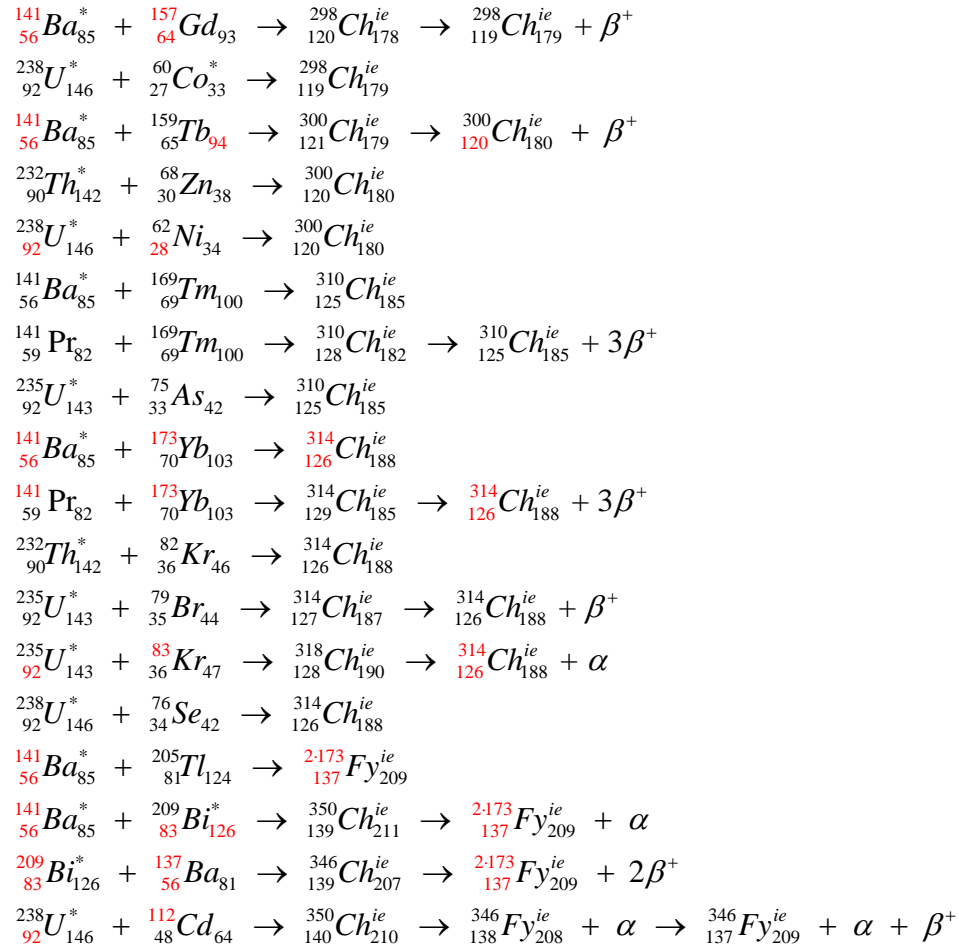
The Synthetic Routes to the 173th Element:



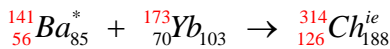


The numbers in red color seems to correlate each other in some meanings.

It should be worthy to synthesize the 119th, 120th, 125th, 126th and 137th elements preferentially. More important and feasible routes to synthesized them should be as follows, among which the synthetic routes to 126th element are the most important and meaningful.



The most important and meaningful synthetic route:



4. Discussion and Conclusion

It is supposed by us the natural end of the elements is the 112th element Cn, and the 113-173th elements were called “the ideal extended elements (*ie*)” or “the frontier of the elements”. It should be very difficult or even impossible to synthesize the ideal extended elements beyond the 118 element Og, but it should be important and meaningful to explore the frontier of the elements and establish suitable theories. The meanings for exploration of the frontier of the elements are comparable to those for explorations of the frontier and origin of the universe or the deepest nature of elementary particles. However, our theoretical explorations of the frontier of the elements are almost costless, but the explorations of the universe and elementary particles are extremely expensive.

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Appendix I: Research and Writing History

Section	Page	Writing Period	Location	Version
Whole Paper	1-5	2022/10/28-30	Chengdu	viXra:2210.0146v1
Whole Paper	1-15	2022/10/28-11/10	Chengdu	viXra:2210.0146v2

Note: date was recorded according to Beijing Time.