Table 2. Lightest isotopes of elements with even Z > 32 with isotopic abundance greater than 2%.

Element	Abundance (%)	Number of neutrons
Zr^{96}	48	50
Mo^{92}	15.5	50
Ru^{96}	5	52
Nd^{142}	25.95	82
Sm^{144}	3	82

NUMBER OF ISOTOPES

Figures 1 and 2* reproduce the parts of the table by Segre in the region of nuclei with 50 and 82 neutrons, respectively. For 82 neutrons, there exist 7 stable nuclei, which, for convenience, shall be called isotones. For neutron number 50, there exist 6 naturally occurring isotones, of which one, Rb^{87} is β active, however, with a lifetime of 10^{11} years and a maximum β energy of .25 Mev. The average number of isotones for odd neutrons is somewhat less than 1; the same number for even N varies as a rule between three and four. The greatest number of isotones, attained only once in the periodic table, is 7 for neutron number 82; 6 isotones are encountered once only, and for neutron number 50. 5 isotones are found 5 times, namely for N = 20, 28, 58, 74, and 78. The frequency of N = 28 is probably due to the stability of Ca^{48}, with 20 protons, that of N = 74 to the stability of Sn^{124}, with 50 protons. As few as 2 isotones for even N are found only three times for heavy nuclei, namely for neutron numbers 84, 86, and 120.

THE SLOPE OF THE CENTER AND THE EDGES OF THE STABILITY CURVE

In the case of neutron number N = 82 two isotones of odd Z are found, La and Pr. The same is the case for N = 50, where the unstable, but long-lived Rb^{87} and Y^{89} differ only in proton number. Only one other case where nuclei of different odd Z have the same number of neutrons is encountered in the periodic table, namely that of Cl^{37} (abundance 24.6%) and K^{39} (abundance 93.3%); this is the case of 20 neutrons. The case of 82 neutrons is most pronounced, since the La and Pr isotopes in question have isotopic abundances of 100%.

As the Segrè Table shows, the isotones Nd^{142} and Sm^{144} are both the lightest isotopes of their respective elements. Here, the limit of the stability for neutron-poor isotopes stays at constant neutron number. Exactly the same is true for N = 50 (Figure 1). This situation does not occur anywhere else in the periodic table.

The limit of stability for neutron-rich isotopes also stays at constant neutron number for N = 50 and N = 82, namely the pairs of isotones, Kr^{86}, Sr^{88} and Xe^{136}, Ba^{138} are the heaviest isotopes of their elements. Such a case is encountered once more in the periodic table: Ca^{48} and Ti^{50} are the heaviest isotopes of their respective elements and have the same neutron number N = 28.

*(Figures were not submitted for publication in this document. Information contained in figures is available in Segrè Table, MDDC 626.—A.E.C., T.I.D.)