

CHAPTER III

STABLE ISOTOPE CHART AND REACTIONS INVOLVING NEUTRONS

3.1 THE SEGRE ISOTOPE CHART

Before considering in further detail the nature of neutron reactions it will be valuable to review the essential features of stable isotopes and what these features imply about nuclear reactions involving neutrons.

A convenient way to summarize data on the various nuclear species is by means of the Segre Isotope Chart. In this chart the number of neutrons (N) is plotted on the vertical axis, the number of protons (Z) on the horizontal axis. Identity and properties of stable and unstable isotopes are labeled in each square corresponding to the observed (Z,N) values. Since the resulting chart would have the general shape shown in Figure 12 and thereby be inconveniently large (most of the chart would be blank space), the chart is usually broken into sections and the sections arranged in a somewhat interlocking pattern. Isotopes (constant Z) appear in the same vertical column, isobars (constant $Z + N$) on the same diagonal, and isotones (constant N) in the same horizontal row.

The stable isotopes lie in a narrow region on the $(Z + N)$ graph as shown in Figure 12. For light elements this region is centered around the $N = Z$ line; for heavier elements the region deviates toward higher numbers of neutrons so that for uranium the most stable isotope has $N - Z = 146 - 92 = 54$.

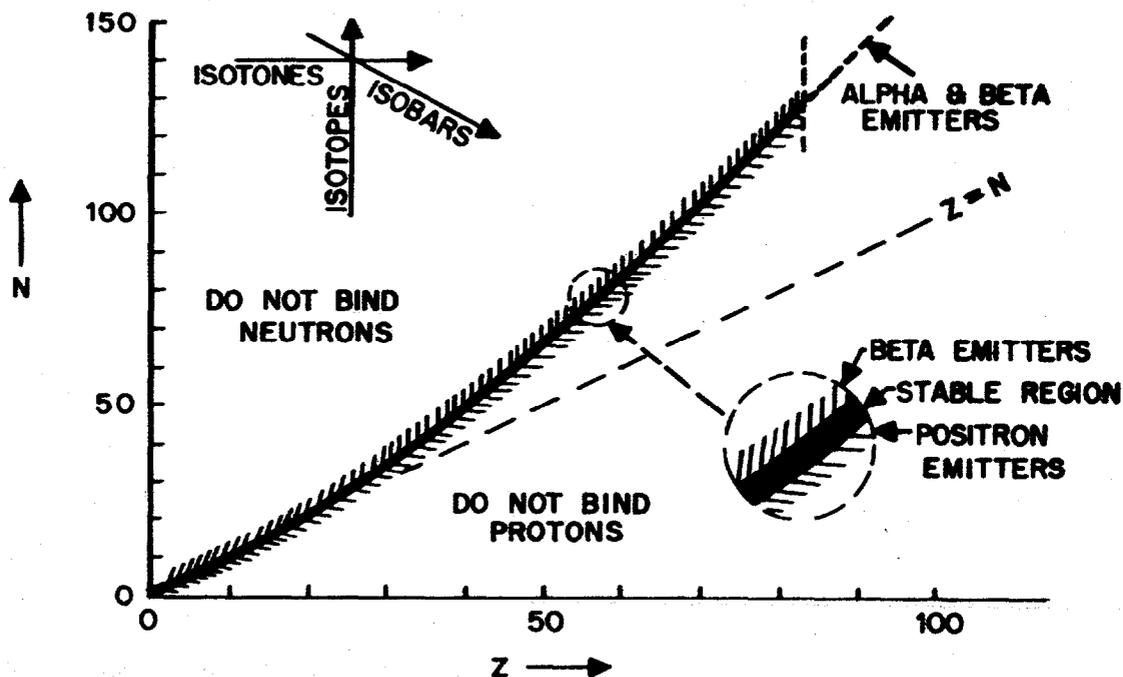


Figure 12. Region of Stable Isotopes

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