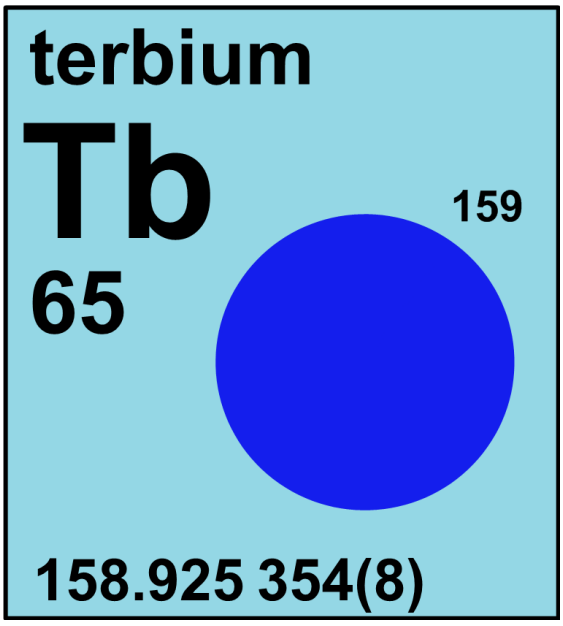
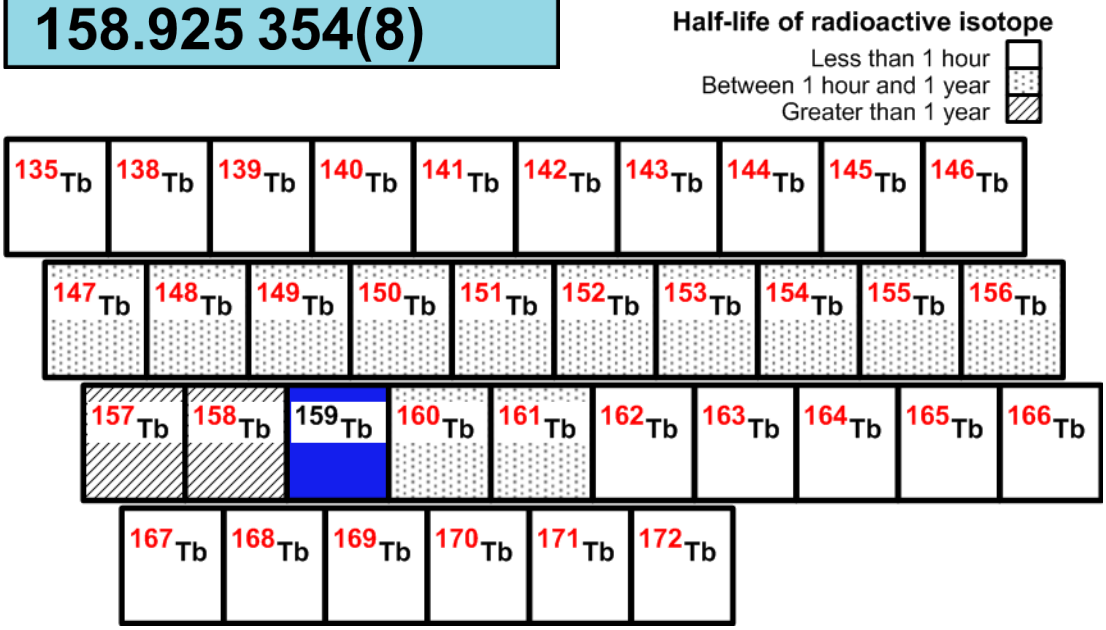
4.65 terbium



Stable isotope	Relative atomic mass	Mole fraction
^{159}Tb	158.925 35	1



4.65.1 Terbium isotopes in medicine

^{149}Tb (with a **half-life** of 4.1 hours) is being used in targeted **radiotherapy** using **alpha particles** for labeling **radioimmunoconjugates** in cancer treatments [455, 456]. ^{161}Tb (with a half-life of 6.9 days) attached to a bioconjugate (two **covalently** linked molecules, one or more of which is a biomolecule), is being used in cancer therapy as a targeted radiation treatment of cancer cells [456, 457]. ^{161}Tb is being used for imaging as it allows for on-line monitoring of its distribution using **gamma cameras** [457]. ^{149}Tb is produced by the reaction ^{142}Nd(^{12}C,5n)^{149}Dy → ^{149}Tb + β^+

and by $^{141}Pr(^{12}C,4n)^{149}Tb$, and beam geometry is important for satisfactory yield of ^{149}Tb (Figure 4.65.1) [458].

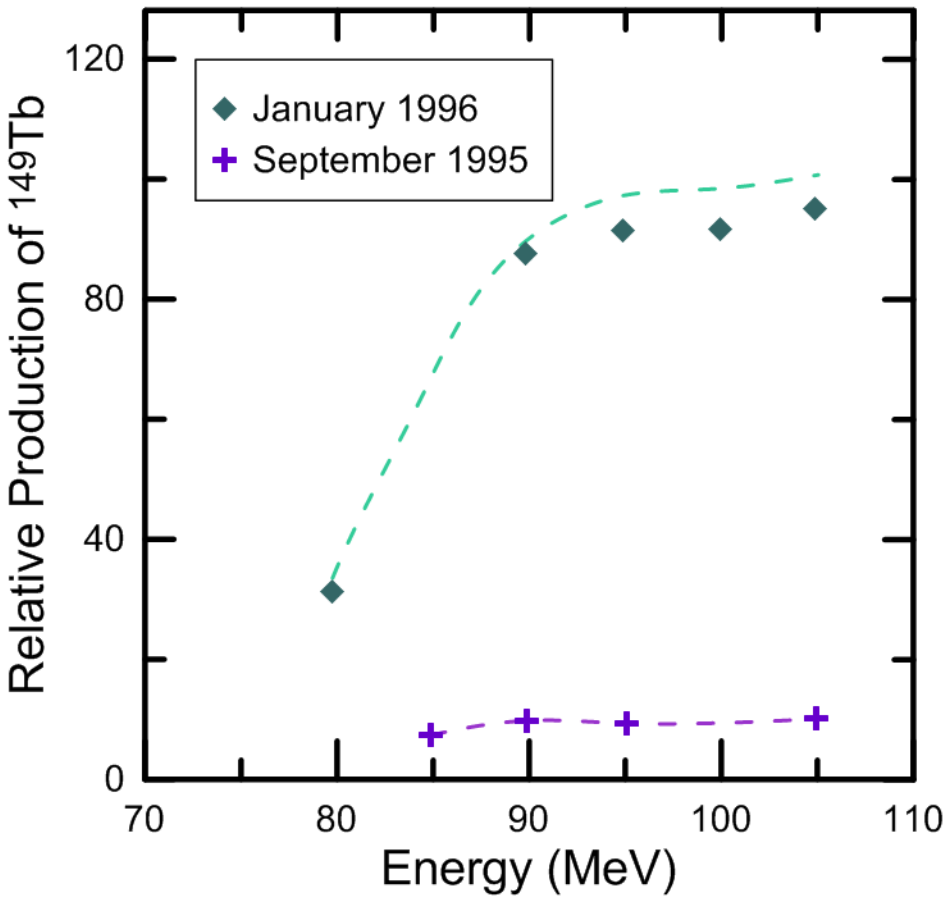


Fig. 4.65.1: Relative production of ^{149}Tb from the reaction $^{142}Nd(^{12}C,5n)^{149}Dy \rightarrow {}^{149}Tb + \beta^+$ for two different beam geometries. A ten-fold increase in production is achieved by optimal beam geometry (January 1996) (modified from [458]).