4.85 astatine

4.85.1 Astatine isotopes in medicine

$^{211}\text{At}$ (with a half-life of 7.2 hours) is known to accumulate in the thyroid and occasionally is the preferred treatment for hyperthyroidism and thyroid cancer because the particles emitted from $^{211}\text{At}$ provide more energy than radiolabeled iodine, the other treatment method (Figure 4.85.1). However, astatine has shown a tendency to induce tumors, so its use is limited [562]. The $^{211}\text{At}$-labeled di-carborane (cluster of boron, carbon, and hydrogen atoms) ligand known as the Venus Flytrap Cluster (VFC) has been used as a robust pharmaceutical in radiotherapy treatment [563].
Fig. 4.85.1: At treats hyperthyroidism and thyroid cancer. (Image Source: © 2012 Terese Winslow LLC, U.S. Govt. has specified rights) [564].