
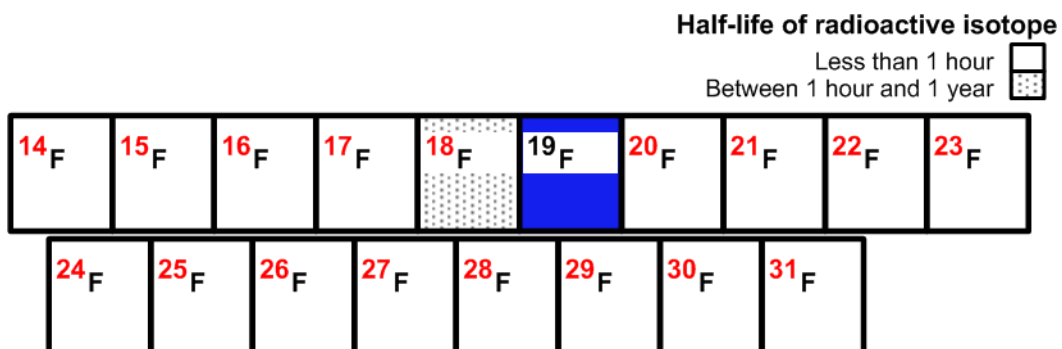


4.9 fluorine

fluorine
F
9

18.998 403 162(5)

Stable isotope	Relative atomic mass	Mole fraction
^{19}F	18.998 403 162	1



4.9.1 Fluorine isotopes in medicine

^{18}F is a radioactive fluorine **isotope** that is used in an ^{18}F -FDG compound (^{18}F -labeled, fluoro-deoxy glucose) for imaging the organs, bones, tissues, and brain of the body with a technique called **positron emission topography (PET)**. The ^{18}F -FDG compound is injected and the **isotopically labeled** glucose is consumed by any cell requiring glucose as a source of energy [95, 96].

- ^{18}F emits **positrons** that collect in tissue and interact with regular negative **electrons** when injected into the body. The positrons and electrons annihilate each other, producing two **gamma rays** that are emitted in opposite directions. The radiation is detected on a PET camera, which generates a picture of the body part being examined (Figure 4.9.1).

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- b. Because ^{18}F has a short **half-life** of about 110 minutes, there is little chance of radiation damage to the patient.



Fig. 4.9.1: An ^{18}F -FDG PET scan is used to observe the differences in brain activity between a sober and an intoxicated brain. (Image Source: National Institute on Alcohol Abuse and Alcoholism (NIAAA)) [97].