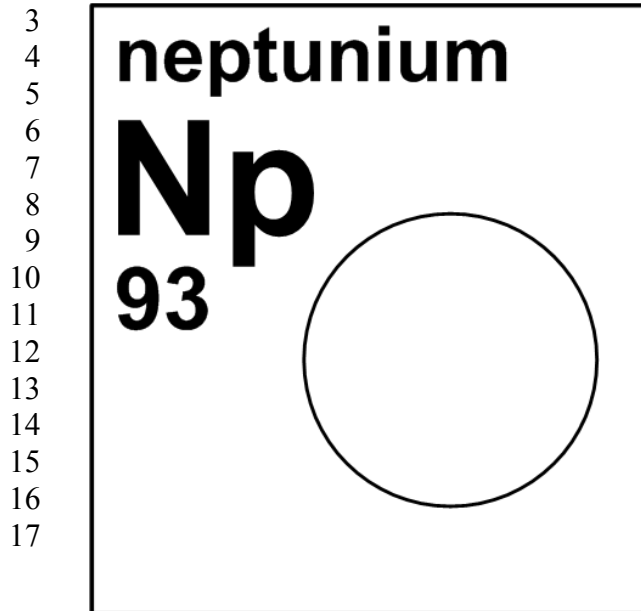





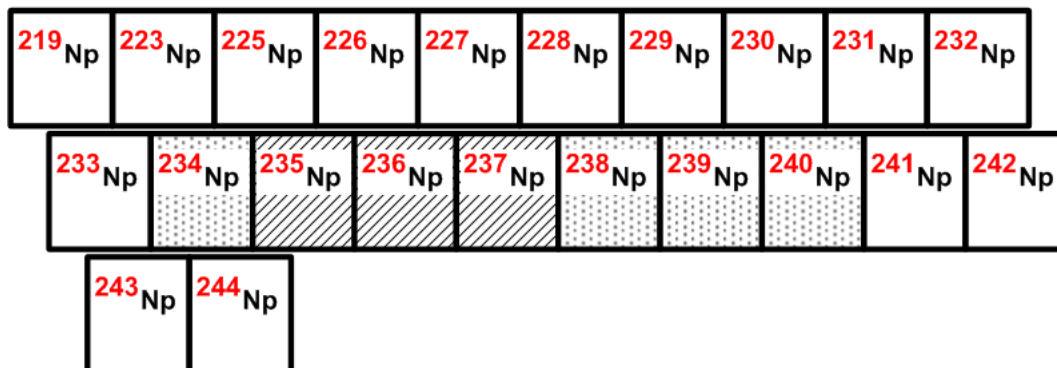
1

2 **4.93 neptunium**

Stable isotope	Relative atomic mass	Mole fraction
(none)		

**Half-life of radioactive isotope**

Less than 1 hour   
 Between 1 hour and 1 year   
 Greater than 1 year 



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21 **4.93.1 Neptunium isotopes in industry**

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23  $^{237}\text{Np}$  (with a **half-life** of  $2.14 \times 10^6$  years) is **fissionable**, meaning that neptunium can be  
 24 bombarded with **neutrons** and, as a result, will create more neutrons that are free to interact with  
 25 nearby material and can be used in fast neutron reactors or in nuclear weapons (Figure 4.93.1)  
 26 [72, 600, 601].  $^{237}\text{Np}$  is used in neutron detection instruments [72].

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**Fig. 4.93.1:**  $^{237}\text{Np}$  is **fissionable** and is used in fast neutron reactors and in nuclear weapons. (U.S. Air Force photo by Senior Airman Alexandra Longfellow, U.S. Department of Energy) [602].

#### 4.93.2 Neptunium isotopes used as a source of radioactive isotope(s)

$^{237}\text{Np}$  is used in the production of  $^{238}\text{Pu}$  (with a half-life of 87.7 years), which is an emitter of **alpha particles** used in thermoelectric generators and **radioisotope**-heater units. When  $^{237}\text{Np}$  captures a neutron, it becomes  $^{238}\text{Np}$ , with a half-life of 2.117 days, which decays to  $^{238}\text{Pu}$  [72].