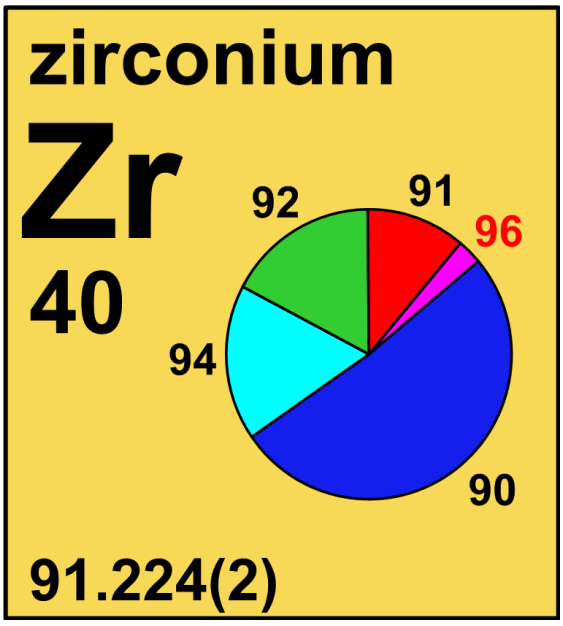
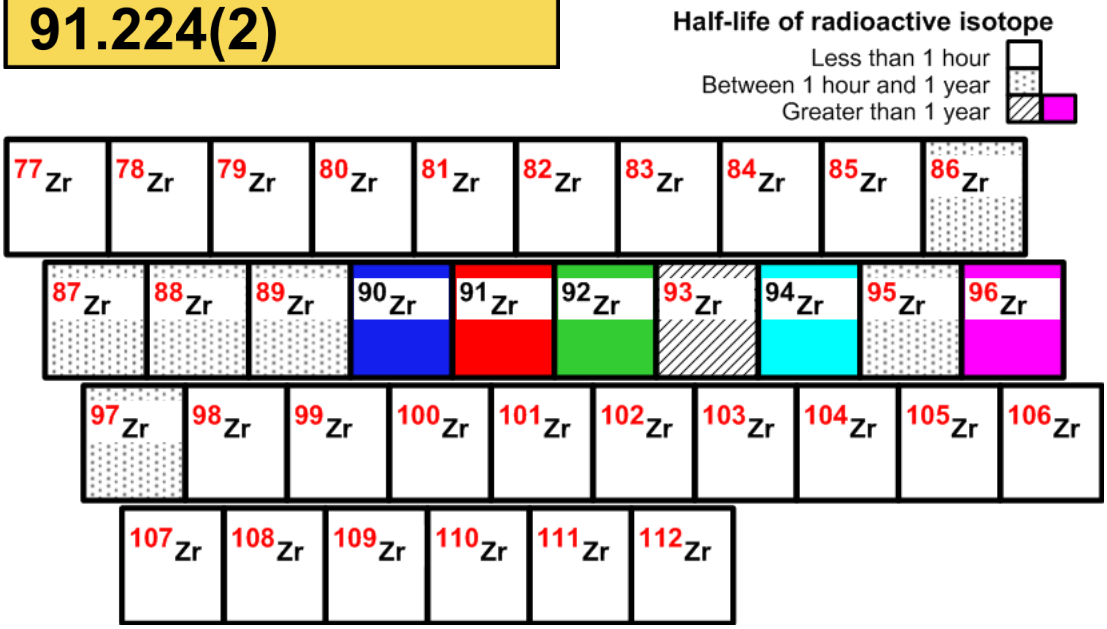
4.40 zirconium



Stable isotope	Relative atomic mass	Mole fraction
^{90}Zr	89.904 70	0.5145
^{91}Zr	90.905 64	0.1122
^{92}Zr	91.905 03	0.1715
^{94}Zr	93.906 31	0.1738
^{96}Zr†	95.908 27	0.0280

† **Radioactive isotope** having a relatively long **half-life** (2.3×10^{19} years) and a characteristic terrestrial **isotopic composition** that contributes significantly and reproducibly to the determination of the **standard atomic weight** of the **element** in **normal materials**.



4.40.1 Zirconium isotopes in industry

Zirconium enriched in ^{90}Zr has been proposed for the cladding (covering) of reactor fuel elements (Figure 4.40.1) because it has a lower **neutron absorption cross section** than natural abundances of zirconium and is well suited for coverage of metal parts without absorbing neutrons [304].

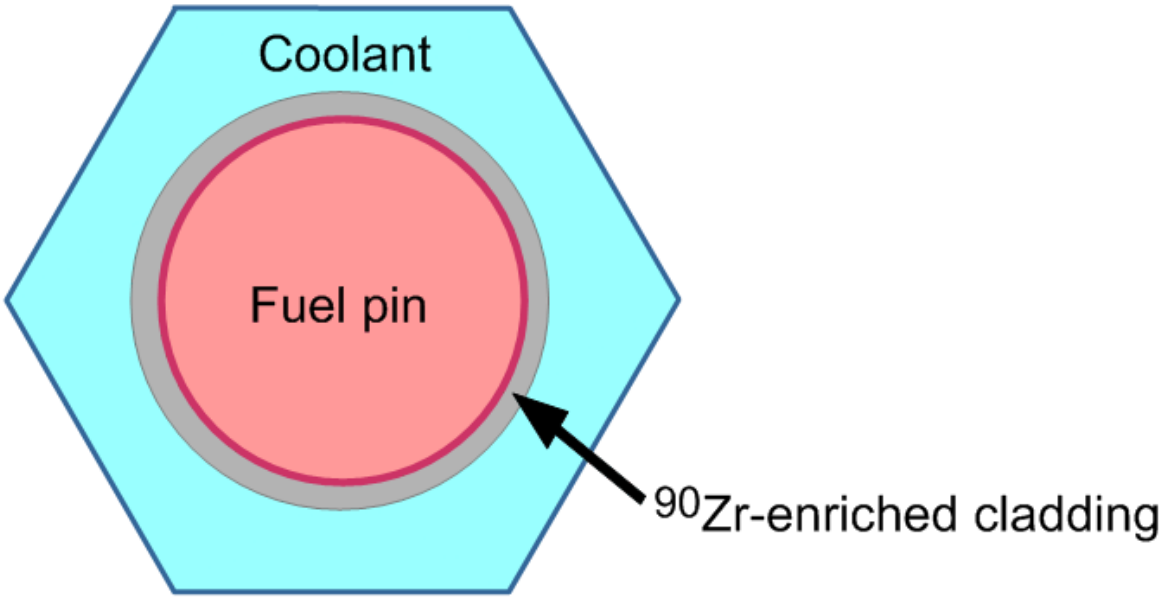


Fig. 4.40.1: The cores of nuclear reactors have fuel pins that are typically made of uranium-oxide. To keep **fission** products from escaping into the coolant, these pins are surrounded by a zirconium clad. (Modified from [305]).