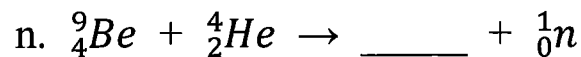
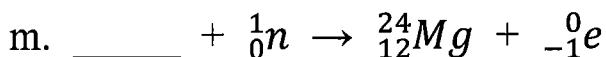
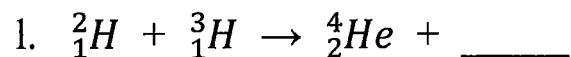
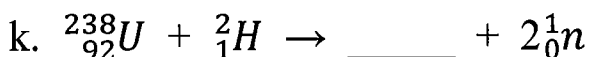
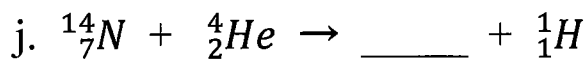
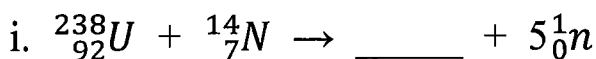
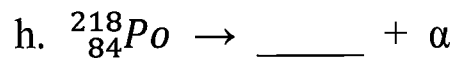
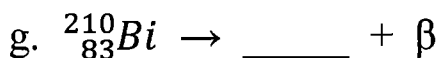
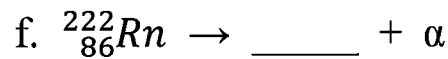
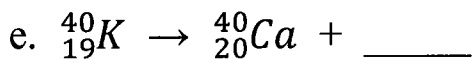
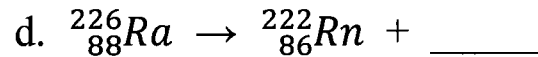
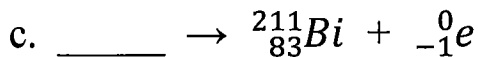
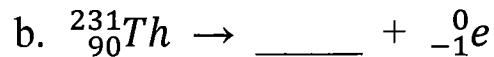


Nuclear Chemistry

1. Complete the following nuclear reactions



o. uranium-238 absorbs a neutron and forms uranium-239

p. uranium-239 emits an electron and forms neptunium-239

q. neptunium-239 emits an electron and forms plutonium-239

2. Titanium-51 decays with a half-life of six minutes. What fraction of the radioactive material present at time zero would still be available after one hour?

3. The half-life of radium-226 is 1590 years. What fraction of a sample of radium-226 would remain after 9540 years?
  
4. After 10 half-lives the radioactivity of a sample is considered to be negligible. How long should strontium-90 be stored if  $T_{1/2} = 28\text{a}$ ? How long should iodine-131 be stored if  $T_{1/2} = 8.05\text{ days}$ ?
  
5. A typical fission process occurs after  ${}^{235}_{92}\text{U}$  absorbs a neutron and becomes the unstable isotope  ${}^{236}_{92}\text{U}$ . This isotope can break apart, producing a  ${}^{137}_{52}\text{Te}$  nucleus, a  ${}^{97}_{40}\text{Zr}$ , and two neutrons. Write an equation to represent this nuclear reaction.
  
6. It is desired to use radioactive sulphur as a tracer in an experiment. Two beta-emitting isotopes are available:  ${}^{35}_{16}\text{S}$  ( $T_{1/2} = 87\text{ days}$ ) and  ${}^{37}_{16}\text{S}$  ( $T_{1/2} = 5\text{ minutes}$ ). Which would you choose and why?
  
7. The half-life of uranium-238 is 4.5 billion years. Explain why there is so much of this isotope still undecayed on Earth.
  
8. The half-life of  ${}^{125}_{53}\text{I}$  is 60 days. What percent of the original radioactivity would be present after 360 days?