NUCLEAR CHEMISTRY PROBLEMS

1. Complete the following nuclear reactions:

   A. $^{221}_{87}Fr \rightarrow {}^{217}_{85}At + \_\_\_$

   B. $^{213}_{83}Bi \rightarrow \_\_\_ + {}^{0}_{-1}e$

   C. $^{37}_{18}Ar + \_\_\_ \rightarrow {}^{37}_{17}Cl$

   D. $^{131}_{53}I \rightarrow 4\,{}^{1}_{0}n + \_\_\_$

2. Write equations for the following nuclear reactions:
   A) Radon-222 decays by alpha emission.

   B) The carbon-14 isotope undergoes beta decay.

3. A radioisotope decays to give an alpha particle and Rn-222. What was the original isotope?

   a) Po-218 b) Th-224 c) Pb-220 d) Ra-226 e) none of these

4. Plutonium-239 has a half life of 2.41×10^4 yr. If you have a 10.0 mg sample how much will remain after 4 half-lives have passed?

5. If you ingest a sample containing Iodine-131, how much time will it take for a 75.0 mg sample to decay to 12.5 mg? The half-life for I-131 is 8.05 days.

6. The half-life of ^{98}Au is 2.7 days. If you begin with 5.6 mg of this gold isotope, what mass remains after 9.5 days?