Name: _____ Per___

Nuclear Chemistry

Review

1. Give the nuclide symbol for the following atoms
   a. Cadmium-110
   b. Barium-137

2. For each of the following statements, state which type (s) of radiation they describe.
   a. Has the highest penetrating power
   b. Has the same structure as an electron
   c. Has the same structure as a helium nucleus
   d. Can be stopped by a piece of paper
   e. Can be stopped by aluminum foil
   f. Can result in a transmutation
   g. Is energy released from an excited electron
   h. Is a type of particle

3. Complete the following nuclear reactions

(a) $^{234}_{90}\text{Th} \rightarrow {}^{0}_{-1}\text{e} + \_\_\_\_$

(b) $^{237}_{93}\text{Np} \rightarrow {}^{233}_{91}\text{Pa} + \_\_\_\_$

(c) $^{209}_{83}\text{Bi}^{*} \rightarrow {}^{209}_{83}\text{Bi} + \_\_\_\_$

(d) $^{235}_{92}\text{U} + {}^{1}_{0}\text{n} \rightarrow {}^{90}_{37}\text{Rb} + \_\_\_\_ + 2\,{}^{1}_{0}\text{n}$

(e) $^{252}_{98}\text{Cf} \rightarrow {}^{106}_{42}\text{Mo} + \_\_\_\_ + 4\,{}^{1}_{0}\text{n}$

(f) $^{32}_{15}\text{P} \rightarrow {}^{32}_{16}\text{S} + \_\_\_\_$

4. Iodine-131 has a half-life of 8.0 days
   a. How long would it take for a 6400 gram sample to decay to 100.0 gram?

   b. How much of a 512 gram sample would remain after 72 days?

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5. Sodium-24 has a half-life of 15.02 hours.
    a. How long would it take for a 400 gram sample to decay to 12.5 g?

    b. How much of an 80 gram sample would remain after 45.06 hours.

    c. How long would it take for a sample to decay to 25.00 % of the original amount?

6. A 30.00 g sample of radium-226 decays to 7.500 g in 3200 years. What is the half-life of this isotope?

7. Rhodium-108 has a half-life of 17 seconds. After 85 seconds, there are 3.0 gram of a sample remaining. What was the mass of the original sample?