Extra Nuclear Reactions Practice!

Part A: Completing Nuclear Decay Reactions

For each of the atoms listed below, REWRITE the decay reaction by solving for ${}^{A}_{Z}X$ or other missing information. Remember that the mass and protons on each side of the arrow need to equal each other.

1) ${}^{256}_{103}Lr \rightarrow {}^{4}_{2}He + {}^{A}_{Z}X$

2) ${}^{247}_{Z}Am \rightarrow {}^{0}_{-1}e + {}^{A}_{Z}X$

3) ${}^{A}_{Z}X \rightarrow {}^{211}_{87}Fr + {}^{4}_{2}He$

4) ${}^{175}_{93}Np \rightarrow {}^{4}_{2}He + {}^{A}_{Z}X$

5) ${}^{6}_{2}He \rightarrow {}^{0}_{-1}e + {}^{A}_{Z}X$

6) ${}^{13}_{5}B \rightarrow {}^{0}_{-1}e + {}^{A}_{Z}X$

7) ${}^{211}_{79}Au \rightarrow {}^{0}_{-1}e + {}^{A}_{Z}X$

8) ${}^{151}_{67}Ho \rightarrow {}^{4}_{2}He + {}^{A}_{Z}X$

9) ${}^{A}_{Z}X + {}^{0}_{-1}e \rightarrow {}^{213}_{Z}Po$

10) ${}^{148}_{57}La \rightarrow {}^{4}_{2}He + {}^{A}_{Z}X$

Part B: Writing Nuclear Decay Reactions:

Write equations for the following nuclear decay reactions. Make sure that both mass numbers and atomic numbers are balanced on each side.

11) Decay of polonium-218 by alpha emission

12) Decay of carbon-14 by beta emission.

13) The alpha decay of radon-198

14) The beta decay of uranium-237

Slightly Different Problems…

The SAME IDEA applies to these as regular nuclear reactions. The left side needs to equal the right side.

One key difference is that if you have a big number in front of your particle you need to multiply the mass and atomic nubmer by that value (kind of like in a chemical formula).

Example: b) $3\,{}^{1}_{0}n$ = 3 x 1 = 3
3 x 0 = 0

Complete the equations for these transmutation reactions:

$a)\ {}^{6}_{3}Li + {}^{1}_{0}n \rightarrow {}^{4}_{2}He + ?$

$b)\ {}^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{141}_{56}Ba + 3\,{}^{1}_{0}n + ?$

$c)\ {}^{27}_{13}Al + {}^{4}_{2}He \rightarrow {}^{1}_{0}n + ?$

$d)\ {}^{235}_{92}U \rightarrow {}^{90}_{38}Sr + {}^{1}_{0}n + 4\,{}^{0}_{-1}e + ?$

$e)\ {}^{1}_{0}n + ? \rightarrow {}^{144}_{58}Ce + {}^{90}_{38}Sr + 6\,{}^{1}_{0}n + 2\,{}^{0}_{-1}e$

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a)

b)

c)

d)

e)

GLUE THIS PART DOWN

Write a hypothetical decay series for uranium-238 that involves alpha and/or beta decay reactions. Flip a coin to determine which type of decay occurs. Heads is alpha decay and tails is beta decay. Repeat this process 15 times. At the end of your decay series calculate the neutron to proton ratio and predict if your final isotope is stable or unstable. Remember that a 1:1 ration of protons to neutrons is ideal.

#1	$^{238}_{92}U \rightarrow$
#2	
#3	
#4	
#5	
#6	
#7	
#8	
#9	
#10	
#11	
#12	
#13	
#14	
#15	