Name : ---------- Date : ----------

Balancing Nuclear Equations

1. Consider the following nuclear reaction: $^{232}U_{92} \rightarrow {}^{4}He_{2} + {}^{234}Th_{2}$

   a. What type of radiation is produced? _____

   b. How does the number of protons in the reactant compare with the total number of protons in the products? _____

   c. How does the number of neutrons in the reactant compare with the total number of neutrons in the products? _____

   d. How does the reactant's mass number compare with the products' total mass number? _____

   e. Show how each side of the reaction would change if a gamma ray were released.

   _____

   _____

2. Balance the mass numbers and atomic numbers to complete the equations. Indicate the type of radiation occurring wherever necessary.

   a) $^{131}I_{53} \rightarrow {}^{0}e_{-1}$ + _____ Type: _____

   b) $^{30}P_{15} \rightarrow {}^{0}e_{1}$ + _____ Type: _____

   c) $^{113}Ag_{47} \rightarrow$ _____ + _____ Type: Beta decay

   d) $^{226}Ra_{88} \rightarrow$ _____ + _____ + _____ Type: Alpha and gamma emission

   e) $^{222}Rn_{86} \rightarrow {}^{4}He_{2}$ + _____ Type: _____

   f) $^{129}I_{53} \rightarrow$ _____ + $^{129}Xe_{54}$ Type: _____

   g) $^{15}O_{8} \rightarrow$ _____ + $^{15}N_{7}$ Type: _____

   h) $^{239}Pu_{94} \rightarrow$ _____ + _____ Type: Alpha decay

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1. Answers

a. What type of radiation is produced? Alpha decay

b. How does the number of protons in the reactant compare with the total number of protons in the products? They are the same

c. How does the number of neutrons in the reactant compare with the total number of neutrons in the products? They are the same

d. How does the reactant's mass number compare with the products' total mass number? They are the same

e. Show how each side of the reaction would change if a gamma ray were released.

$^{238}U_{92} \rightarrow {}^{4}He_{2} + {}^{234}Th_{90} + {}^{0}\gamma_{0}$

A gamma ray has no mass or charge. So it would not affect the reaction.

2.

a) $^{131}I_{53} \rightarrow {}^{0}e_{-1} + {}^{131}Xe_{54}$ Type: Beta decay

b) $^{30}P_{15} \rightarrow {}^{0}e_{1} + {}^{30}Si_{14}$ Type: Positron emission

c) $^{113}Ag_{47} \rightarrow {}^{0}e_{-1} + {}^{113}Cd_{48}$ Type: Beta decay

d) $^{226}Ra_{88} \rightarrow {}^{4}He_{2} + {}^{222}Rn_{86} + {}^{0}\gamma_{86}$ Type: Alpha and gamma emission

e) $^{222}Rn_{86} \rightarrow {}^{4}He_{2} + {}^{218}Po_{84}$ Type: Alpha decay

f) $^{129}I_{53} \rightarrow {}^{0}e_{-1} + {}^{129}Xe_{54}$ Type: Beta decay

g) $^{15}O_{8} \rightarrow {}^{0}e_{+1} + {}^{15}N_{7}$ Type: Positron emission

h) $^{239}Pu_{94} \rightarrow {}^{4}He_{2} + {}^{235}U_{92}$ Type: Alpha decay