

Name : _____ Date : _____

Balancing Nuclear Equations

1. Consider the following nuclear reaction: $^{232}\text{U}_{92} \rightarrow ^4\text{He}_2 + ^{228}\text{Th}_{90}$

- What type of radiation is produced? _____
- How does the number of protons in the reactant compare with the total number of protons in the products? _____
- How does the number of neutrons in the reactant compare with the total number of neutrons in the products? _____
- How does the reactant's mass number compare with the products' total mass number? _____
- 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.

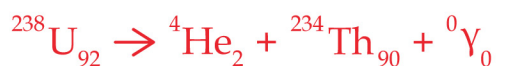
- $^{131}\text{I}_{53} \rightarrow ^0\text{e}_{-1} + \underline{\hspace{2cm}}$ Type: _____
- $^{30}\text{P}_{15} \rightarrow ^0\text{e}_1 + \underline{\hspace{2cm}}$ Type: _____
- $^{113}\text{Ag}_{47} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$ Type: Beta decay
- $^{226}\text{Ra}_{88} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$ Type: Alpha and gamma emission
- $^{222}\text{Rn}_{86} \rightarrow ^4\text{He}_2 + \underline{\hspace{2cm}}$ Type: _____
- $^{129}\text{I}_{53} \rightarrow \underline{\hspace{2cm}} + ^{129}\text{Xe}_{54}$ Type: _____
- $^{15}\text{O}_8 \rightarrow \underline{\hspace{2cm}} + ^{15}\text{N}_7$ Type: _____
- $^{239}\text{Pu}_{94} \rightarrow \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$ 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.



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

2.

- a) ${}^{131}\text{I}_{53} \rightarrow {}^0\text{e}_{-1} + \underline{{}^{131}\text{Xe}_{54}}$ Type: Beta decay
- b) ${}^{30}\text{P}_{15} \rightarrow {}^0\text{e}_1 + \underline{{}^{30}\text{Si}_{14}}$ Type: Positron emission
- c) ${}^{113}\text{Ag}_{47} \rightarrow \underline{{}^0\text{e}_{-1}} + \underline{{}^{113}\text{Cd}_{48}}$ Type: Beta decay
- d) ${}^{226}\text{Ra}_{88} \rightarrow \underline{{}^4\text{He}_2} + \underline{{}^{222}\text{Rn}_{86}} + \underline{{}^0\gamma_{86}}$ Type: Alpha and gamma emission
- e) ${}^{222}\text{Rn}_{86} \rightarrow {}^4\text{He}_2 + \underline{{}^{218}\text{Po}_{84}}$ Type: Alpha decay
- f) ${}^{129}\text{I}_{53} \rightarrow \underline{{}^0\text{e}_{-1}} + \underline{{}^{129}\text{Xe}_{54}}$ Type: Beta decay
- g) ${}^{15}\text{O}_8 \rightarrow \underline{{}^0\text{e}_{+1}} + \underline{{}^{15}\text{N}_7}$ Type: Positron emission
- h) ${}^{239}\text{Pu}_{94} \rightarrow \underline{{}^4\text{He}_2} + \underline{{}^{235}\text{U}_{92}}$ Type: Alpha decay