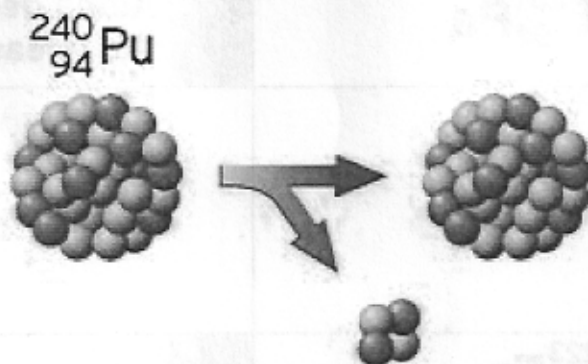


Practice - Radioactive Decay

Examine the diagram of a plutonium nucleus undergoing alpha nuclear decay. Use a periodic table to answer each of the questions below.



1. What is the new chemical identity of the plutonium atom after it has emitted an alpha particle?

Uranium - or - $^{236}_{92}\text{U}$

2. When the plutonium atom undergoes alpha decay, how does the number of protons in the nucleus change? How does the number of neutrons in the nucleus change?

The # of p^+ decreases by 2.

The # of n^0 decreases by 2

(mass # decreases by 4)

3. Based on your answer to question 2, describe the composition of an alpha particle.

An alpha particle is composed of $2p^+$ & $2n^0$.

4. An alpha particle is identical to the nucleus of another element in the periodic table. Identify this element.

Helium

5. Create an appropriate symbol for an alpha particle that incorporates your answers to questions 3 and 4 above.

^4_2He

6. Can you explain why alpha particles are deflected away from a positively charged plate?

With $2p^+$ & no e^- to cancel their charge

out (neutrons are neutral), the net

charge on an alpha particle is $2+$. Like charges repel.

Radioactive Decay

Write a nuclear equation for each of the following descriptions below.

1. Alpha decay of ${}_{91}^{231}\text{Pa}$	6. Alpha decay of ${}_{62}^{146}\text{Sm}$ that includes the release of a gamma ray.
${}_{91}^{231}\text{Pa} \rightarrow {}_{89}^{227}\text{Ac} + {}_2^4\text{He}$	${}_{62}^{146}\text{Sm} \rightarrow {}_{60}^{142}\text{Nd} + {}_2^4\text{He} + \gamma$
2. Beta decay of ${}_{87}^{223}\text{Fr}$	7. Beta decay of ${}_{85}^{198}\text{At}$
${}_{87}^{223}\text{Fr} \rightarrow {}_{88}^{223}\text{Ra} + {}_{-1}^0\text{e}$	${}_{85}^{198}\text{At} \rightarrow {}_{86}^{198}\text{Rn} + {}_{-1}^0\text{e}$
3. Alpha decay of ${}_{62}^{149}\text{Sm}$	8. Alpha decay of ${}_{64}^{150}\text{Gd}$ that includes the release of a gamma ray
${}_{62}^{149}\text{Sm} \rightarrow {}_{60}^{145}\text{Nd} + {}_2^4\text{He}$	${}_{64}^{150}\text{Gd} \rightarrow {}_{62}^{146}\text{Sm} + {}_2^4\text{He} + \gamma$
4. Beta decay of ${}_{61}^{165}\text{Pm}$	9. Beta decay of ${}_{54}^{152}\text{Xe}$
${}_{61}^{165}\text{Pm} \rightarrow {}_{62}^{165}\text{Sm} + {}_{-1}^0\text{e}$	${}_{54}^{152}\text{Xe} \rightarrow {}_{55}^{152}\text{Cs} + {}_{-1}^0\text{e}$
5. Alpha decay of ${}_{101}^{249}\text{Md}$	10. Beta decay of ${}_{55}^{120}\text{Cs}$
${}_{101}^{249}\text{Md} \rightarrow {}_{99}^{245}\text{Es} + {}_2^4\text{He}$	${}_{55}^{120}\text{Cs} \rightarrow {}_{56}^{120}\text{Ba} + {}_{-1}^0\text{e}$