

Half-Life of Isotopes

1. How much of a 100.0 g sample of Au-198 is left over after 8.10 days if its half-life is 2.70 days?
2. The half-life of K-42 is 12.4 hours. How much of a 750 g sample is left after 62.0 hours?
3. The half-life of Th-232 is 1.4×10^{10} years. If there are 25.0 g of the sample left after 2.8×10^{10} years, how many grams were in the original sample?
4. There are 5.0 g of I-131 after 40.35 days. How many grams were in the original sample if its half-life is 8.07 days?

Nuclear Equations

1. Write a balanced equation for each of the following reactions, showing mass and charge on all species.
 - a. tin-121 undergoes beta emission
 - b. ^{67}Ga decays giving ^{67}Ge as the daughter
 - c. ^8Be emits an alpha particle

Rewrite the following equations. Fill in all the missing information.

1. $^{129}_{53}\text{I} \rightarrow ^0_{-1}\text{e} + \underline{\quad ? \quad}$
2. $^{216}_{86}\text{Rn} \rightarrow ^4_2\alpha + \underline{\quad ? \quad}$
3. $\underline{\quad ? \quad} \rightarrow ^4_2\alpha + ^{239}_{97}\text{Bk}$
4. $\underline{\quad ? \quad} \rightarrow ^0_{-1}\text{e} + ^{52}_{23}\text{V}$
5. $^{255}_{?}\text{Rf} \rightarrow ^4_2\alpha + \underline{\quad ? \quad}$
6. $^{85}_{?}\text{Br} \rightarrow \underline{\quad ? \quad} + ^{85}_{?}\text{Kr} + ^0_0\gamma$
7. $\underline{\quad ? \quad} \rightarrow ^0_{-1}\text{e} + ^{32}_{?}\text{S} + ^0_0\gamma$
8. $^{257}_{101}\text{Md} \rightarrow ^4_2\alpha + ^4_2\alpha + \underline{\quad ? \quad}$

Write nuclear equations that describe the following processes.

9. Uranium-235 undergoes an alpha decay to produce thorium-231.
10. Lanthanum -144 becomes cerium-144 when it undergoes a beta decay.
11. Neptunium-233 is formed when americium-237 undergoes a nuclear decay process.
12. When protactinium-229 goes through two alpha decays, francium-221 is formed.
13. Uranium-238 undergoes an alpha decay and produces two gamma rays.
14. The neon-22 nucleus is formed when an element undergoes a beta decay.
15. Samarium-146 is produced when an element undergoes an alpha decay.
16. The beta decay of dysprosium-165 creates a new element.