

BALANCING NUCLEAR REACTIONS WORKSHEET

Predict the missing product or reactant in the following nuclear reactions.

- 1.) ${}^{42}_{19}\text{K} \rightarrow {}^{0}_{-1}\text{e} + \underline{\hspace{2cm}}$
- 2.) ${}^{239}_{94}\text{Pu} \rightarrow {}^4_2\text{He} + \underline{\hspace{2cm}}$
- 3.) ${}^{235}_{92}\text{U} \rightarrow \underline{\hspace{2cm}} + {}^{231}_{90}\text{Th}$
- 4.) ${}^1_1\text{H} + {}^3_1\text{H} \rightarrow \underline{\hspace{2cm}}$
- 5.) ${}^6_3\text{Li} + {}^1_0\text{n} \rightarrow {}^4_2\text{He} + \underline{\hspace{2cm}}$
- 6.) ${}^{27}_{13}\text{Al} + {}^4_2\text{He} \rightarrow {}^{30}_{15}\text{P} + \underline{\hspace{2cm}}$
- 7.) ${}^9_4\text{Be} + {}^1_1\text{H} \rightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$
- 8.) ${}^{37}_{19}\text{K} \rightarrow {}^{0}_{+1}\text{e} + \underline{\hspace{2cm}}$
- 9.) $\underline{\hspace{2cm}} + {}^1_0\text{n} \rightarrow {}^{142}_{56}\text{Ba} + {}^{91}_{36}\text{Kr} + 3\,{}^1_0\text{n}$
- 10.) ${}^{238}_{92}\text{U} + {}^4_2\text{He} \rightarrow \underline{\hspace{2cm}} + {}^1_0\text{n}$
- 11.) ${}^{14}_6\text{C} \rightarrow {}^{14}_7\text{N} + \underline{\hspace{2cm}}$
- 12.) ${}^{187}_{75}\text{Re} + \underline{\hspace{2cm}} \rightarrow {}^{188}_{75}\text{Re} + {}^1_1\text{H}$
- 13.) ${}^{22}_{11}\text{Na} + \underline{\hspace{2cm}} \rightarrow {}^{22}_{10}\text{Ne}$
- 14.) ${}^{218}_{84}\text{Po} \rightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$
- 15.) ${}^{253}_{99}\text{Es} + {}^4_2\text{He} \rightarrow {}^1_0\text{n} + \underline{\hspace{2cm}}$

HALF-LIFE PROBLEMS WORKSHEET

1. What is the half-life of a 100.0 g sample of nitrogen-16 that decays to 12.5 grams in 21.6 seconds?
2. All isotopes of technetium are radioactive, but they have widely varying half-lives. If an 800.0 gram sample of technetium-99 decays to 100.0 g of technetium-99 in 639,000 years, what is its half-life?
3. A 208 g sample of sodium-24 decays to 13.0 g of sodium-24 within 60.0 hours. What is the half-life of this radioactive isotope?
4. If the half-life of iodine-131 is 8.10 days, how long will it take a 50.00 g sample to decay to 6.25 g?

UNIT 16 - NUCLEAR CHEMISTRY

5. The half-life of hafnium-156 is 0.025 seconds. How long will it take a 560 g sample to decay to one-fourth of its original mass?
6. Chromium-48 has a short half-life of 21.6 hours. How long will it take 360.00 g of chromium-48 to decay to 11.25 g?
7. Potassium-42 has a half-life of 12.4 hours. How much of an 848 g sample of potassium-42 will be left after 62.0 hours?
8. Carbon-14 has a half-life of 5730 years. How much of a 144 g sample of carbon-14 will remain after 1.719×10^4 years?

Answers:

- | | | | | |
|------------|----------------|-----------|---------------|--------------|
| 1. 7.2 sec | 2. 213,000 yrs | 3. 15 hrs | 4. 24.30 days | 5. 0.050 sec |
| 6. 108 hrs | 7. 26.5 g | 8. 18 g | 9. 200 g | 10. 1.5625 g |