

UNIT 16 – NUCLEAR CHEMISTRY

BALANCING NUCLEAR REACTIONS WORKSHEET

Predict the missing product or reactant in the following nuclear reactions. Determine the type of nuclear reaction (α emission, β emission, γ emission, positron emission, artificial transmutation, fission, or fusion) described.

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

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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?
- 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?
- 9.) If the half-life of uranium-235 is 7.04×10^8 years and 12.5 g of uranium-235 remain after 2.82×10^9 years, how much of the radioactive isotope was in the original sample?