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.

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

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?

10. Germanium-66 decays by positron emission, with a half-life of 2.5 hours. Write a nuclear equation for the decay. How much ^{66}Ge remains from a 25.0 gram sample after 10.0 hours?

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