

Name _____

Date _____

Applying Knowledge
Section 7.3

Use with textbook pages 312-321.

Nuclear fission and fusion reactions

Remember the following two rules when working with nuclear equations:

- The sum of the mass numbers does not change.
- The sum of the charges in the nucleus does not change.

Identify each nuclear equation (nuclear fission or nuclear fusion) and then complete the nuclear equation.

- ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{143}_{54}\text{Xe} + {}^{90}_{38}\text{Sr} + {}^1_0n$
- ${}^2_1\text{H} + \text{---} \rightarrow {}^1_1\text{H} + {}^3_1\text{H}$
- ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{152}_{60}\text{Nd} + \text{---} + 4{}^1_0n$
- ${}^2_1\text{H} + {}^2_1\text{H} \rightarrow {}^3_2\text{He} + \text{---}$
- ${}^1_0n + \text{---} \rightarrow {}^{90}_{37}\text{Rb} + {}^{143}_{55}\text{Cs} + 3{}^1_0n$
- ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + \text{---}$
- ${}^1_0n + {}^{256}_{100}\text{Fm} \rightarrow \text{---} + {}^{140}_{54}\text{Xe} + 4{}^1_0n$
- ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{106}_{39}\text{Y} + \text{---} + 3{}^1_0n$
- ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{115}_{49}\text{In} + {}^{118}_{43}\text{Tc} + \text{---} + {}^1_0n$
- ${}^1_0n + \text{---} \rightarrow {}^{137}_{52}\text{Te} + {}^{100}_{42}\text{Mo} + 3{}^1_0n$

Name _____

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Assessment
Section 7.3

Use with textbook pages 312-321.

Nuclear reactions

Match each number on the Diagram of a nuclear reaction on the left with the correct descriptor on the right. Each Descriptor may be used more than once.

Diagram of a nuclear reaction:	Descriptor
1.	A. energy
2.	B. neutron
3.	C. parent isotope
4.	D. nuclear fusion
5.	E. nuclear fission
6.	F. daughter isotope

- What is the symbol for a proton?
 - ${}^4_2\alpha$
 - ${}^0_0\gamma$
 - ${}^0_0\gamma$
 - ${}^1_1\text{H}$
 - ${}^1_1\text{p}$
- Which of the following is the source of the Sun's energy?
 - convection
 - nuclear fusion
 - nuclear fission
 - CANDU reactor

- Which of the following represents a nuclear fusion equation?
 - ${}^{234}_{90}\text{Th} \rightarrow {}^{230}_{88}\text{Ra} + {}^4_2\text{He}$
 - ${}^{238}_{92}\text{U} \rightarrow {}^{234}_{90}\text{Th} + {}^4_2\text{He} + 2\gamma$
 - ${}^2_1\text{H} + {}^3_1\text{H} \rightarrow {}^4_2\text{He} + {}^1_0n + \text{energy}$
 - ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{92}_{36}\text{Kr} + {}^{141}_{56}\text{Ba} + 3{}^1_0n + \text{energy}$

- What is the total mass number?
 - 92
 - 95
 - 234
 - 236

- How many neutrons are released in this nuclear equation?

$${}^1_0n + {}^{239}_{94}\text{Pu} \rightarrow {}^{141}_{54}\text{Xe} + {}^{97}_{40}\text{Zr} + 2{}^1_0n$$
 - 0
 - 2
 - 3
 - 1

- What isotope balances this nuclear reaction?

$${}^1_0n + {}^{235}_{92}\text{U} \rightarrow \text{---} + {}^{119}_{50}\text{Sn} + 3{}^1_0n$$
 - ${}^{114}_{39}\text{Y}$
 - ${}^{117}_{39}\text{Y}$
 - ${}^{114}_{42}\text{Mo}$
 - ${}^{117}_{42}\text{Mo}$

- What is needed for nuclear fusion to occur?

I.	pressure
II.	a beta particle
III.	high temperature

 - I and II only
 - II and III only
 - I, II, and III
 - I and III only

Use with textbook pages 286-299.

Radioactive decay and nuclear equations

Remember the following two rules when working with nuclear equations:

- I. The sum of the mass numbers does not change.
- II. The sum of the charges in the nucleus does not change.

Identify each nuclear equation as alpha decay, beta decay, or gamma decay, and then complete the nuclear equation.

1. ${}_{15}^{32}\text{P} \rightarrow \text{_____} + \text{_____}$
2. ${}_{84}^{218}\text{Po} \rightarrow \text{_____} + \text{_____}$
3. ${}_{18}^5\text{Ar} \rightarrow \text{_____} + \text{_____}$
4. ${}_{12}^{24}\text{Mg}^* \rightarrow \text{_____} + \text{_____}$
5. ${}_{91}^{234}\text{Pa} \rightarrow \text{_____} + \text{_____}$
6. ${}_{58}^{141}\text{Ce} \rightarrow \text{_____} + \text{_____}$
7. ${}_{84}^{216}\text{Po} \rightarrow \text{_____} + \text{_____}$
8. ${}_{20}^9\text{F} \rightarrow \text{_____} + \text{_____}$
9. ${}_{58}^{58}\text{Fe}^* \rightarrow \text{_____} + \text{_____}$
10. ${}_{87}^{221}\text{Fr} \rightarrow \text{_____} + \text{_____}$
11. ${}_{64}^{149}\text{Gd}^* \rightarrow \text{_____} + \text{_____}$
12. ${}_{86}^{226}\text{Ra} \rightarrow \text{_____} + \text{_____}$
13. ${}_{82}^{212}\text{Pb} \rightarrow \text{_____} + \text{_____}$
14. ${}_{83}^{214}\text{Bi} \rightarrow \text{_____} + \text{_____}$
15. ${}_{98}^{254}\text{Cf} \rightarrow \text{_____} + \text{_____}$