

Nuclear Radiation

1. Define the following terms:
 - a) **Radioactivity** -
 - b) **Radiation** -
 - c) **Radioisotopes** -
2. Describe what happens to a nucleus during radioactive decay.

3. Fill in the following chart for the three types of decay,

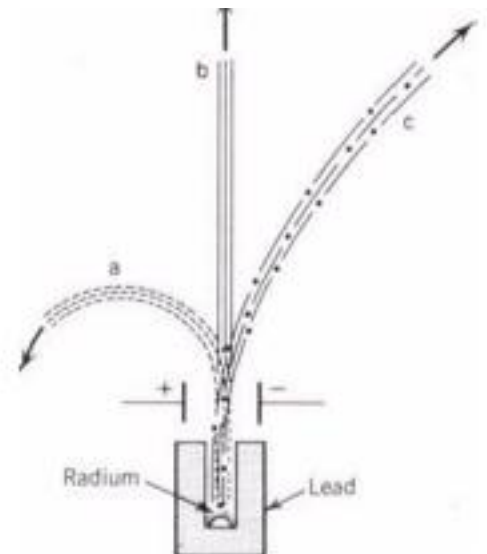
Characteristics of Alpha, Beta, and Gamma radiation			
Property	Alpha	Beta	Gamma
What is it?			
Symbol			
Charge			
What stops it?			

4. Which type of radiation is a packet of energy (photon) and not a particle?
5. Which type of radiation is a helium nucleus?
6. Which type of radiation is a super-fast moving electron?
7. Which type of decay results in an increase in the atomic number for the decay product?
8. Which type of decay results in a decrease in the atomic number for the decay product?
9. Which type of decay results in no change in the atomic number for the decay product?

10. Identify the type of radiation shown in the diagram to the left and state the charge of the particle.

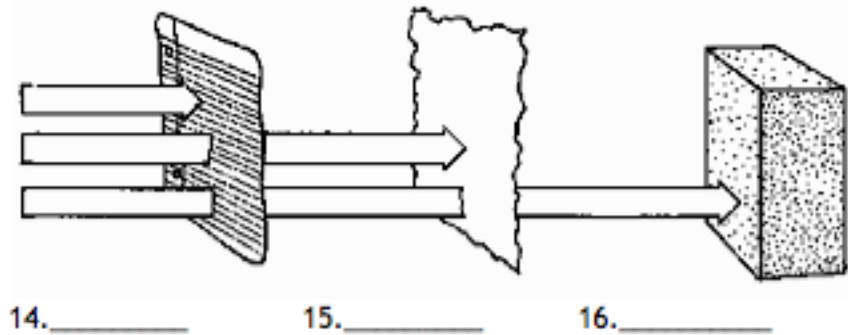
type of particle a b c

charge



Identify alpha, beta, and gamma radiation and name the materials that can stop them.

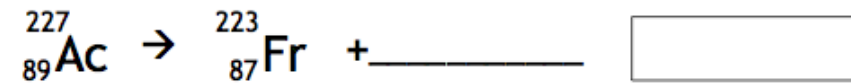
11. _____
 12. _____
 13. _____



17. In the symbol ${}^4_2\text{He}$ what number is the:
 a) mass number? b) atomic number? c) # of protons?

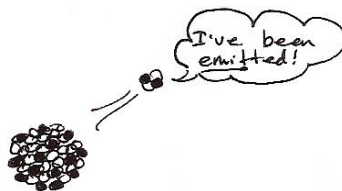
18. Fill in the following reaction equations with the missing product and type of decay.

Alpha = ${}^4_2\text{He}$ Beta = ${}^0_{-1}\text{e}$ Gamma = γ
Type of Decay



19. Write the equation for the alpha decay of Uranium-238.
20. Write the equation for the beta decay of Thorium-230.
21. Write the equations for three alpha decay reactions and two beta decays for Uranium-238. The daughter isotope (product) from each reaction will be the starting material in the next reaction.
- (alpha)
 - (alpha)
 - (alpha)
 - (beta)
 - (beta)
22. Nuclei often emit _____ along with alpha or beta particles during radioactive decay.

Dougherty Valley HS Chemistry
The Nucleus – Radioactivity
Nuclear Equations



Name: _____
Date: _____
Period: _____

Write "isotopic symbols" for:

Example:



alpha, α	beta, β^-	gamma, γ	positron, β^+	neutron, n^0

Nuclear Change:

_____ → _____

_____ → _____

Complete these nuclear reactions:

- $${}_{92}^{238}\text{U} \rightarrow {}_{90}^{234}\text{Th} + \boxed{} \quad (\text{_____ decay})$$
- $${}_{90}^{234}\text{Th} \rightarrow {}_{91}^{234}\text{Pa} + \boxed{} \quad (\text{_____ decay})$$
- $${}_{91}^{234}\text{Pa} \rightarrow \boxed{} + {}_2^4\text{He} \quad (\text{alpha decay})$$
- $${}_{86}^{220}\text{Rn} \rightarrow \boxed{} + {}_2^4\text{He} \quad (\text{alpha decay})$$
- $${}_{84}^{216}\text{Po} \rightarrow \boxed{} + {}_{-1}^0\text{e} \quad (\text{beta decay})$$
- $${}_{6}^{14}\text{C} \rightarrow {}_{7}^{14}\text{N} + \boxed{} \quad (\text{_____ decay})$$
- $${}_{83}^{210}\text{Bi} \rightarrow \boxed{} + \boxed{} \quad (\text{beta decay})$$
- $${}_0^1\text{n} + {}_5^{10}\text{B} \rightarrow \boxed{} + {}_2^4\text{He} \quad (\text{neutron bombardment w/alpha emission})$$
- $${}_{12}^{23}\text{Mg} \rightarrow \boxed{} + \boxed{} + {}_0^0\gamma \quad (\text{positron decay w/gamma emission})$$

Dougherty Valley HS Chemistry
Nuclear Chemistry Worksheet

Name:
Date:
Period:

Using your knowledge of nuclear chemistry, write the equations for the following processes:

1) The alpha decay of radon-198

2) The beta decay of uranium -237

3) Positron emission from silicon-26

~~4) Sodium-22 undergoes electron capture~~

5) What is the difference between nuclear fusion and nuclear fission?

6) Name three uses for nuclear reactions.

Dougherty Valley HS Chemistry
Nuclear Reaction Practice

Name:
Date:
Period:

Fill in the missing symbol and name the following reactions:

<u>Reaction</u>	<u>Name</u>
1. ${}^3_1\text{H} \rightarrow \underline{\hspace{2cm}} + {}^0_{-1}e$	_____
2. ${}^{232}_{92}\text{U} \rightarrow {}^{228}_{88}\text{Ra} + \underline{\hspace{2cm}}$	_____
3. ${}^{144}_{58}\text{Ce} \rightarrow {}^{144}_{59}\text{Pr} + \underline{\hspace{2cm}}$	_____
4. ${}^{65}_{30}\text{Zn} \rightarrow \underline{\hspace{2cm}} + {}^0_{+1}e$	_____
5. ${}^{40}_{19}\text{K} \rightarrow {}^{40}_{18}\text{Ar} + {}^0_{+1}e$	_____
6. ${}^7_4\text{Be}^* \rightarrow {}^7_4\text{Be} + \underline{\hspace{2cm}}$	_____
7. ${}^1_0n + {}^{235}_{92}\text{U} \rightarrow {}^{236}_{92}\text{U}^* \rightarrow {}^{141}_{55}\text{Cs} + \underline{\hspace{2cm}} + 2{}^1_0n$	_____
8. ${}^{222}_{86}\text{Rn} \rightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$	_____
9. ${}^{129}_{53}\text{I} \rightarrow {}^{129}_{54}\text{Xe} + \underline{\hspace{2cm}}$	_____
10. ${}^1_1\text{H} + {}^1_1\text{H} \rightarrow \underline{\hspace{2cm}} + {}^0_{+1}e$	_____
11. ${}^{239}_{94}\text{Pu} \rightarrow \underline{\hspace{2cm}} + {}^4_2\text{He}$	_____
12. ${}^{15}_8\text{O} \rightarrow {}^{15}_7\text{N} + \underline{\hspace{2cm}}$	_____