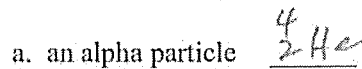


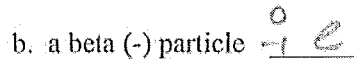
CHEMISTRY 103 - WORKSHEET
DISCOVERING THE SECRETS OF THE NUCLEUS

Key

1. Using the form A_ZX , give the symbol for each of the following



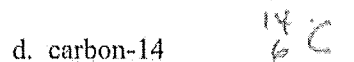
e. uranium-235



f. a proton



g. a neutron

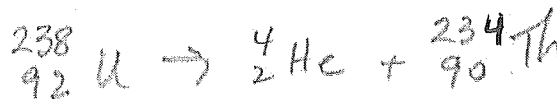


h. a positron



2. Write a nuclear equation for each of the following processes

a. the alpha decay of Uranium-238



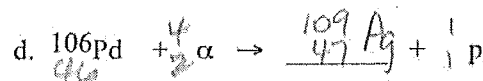
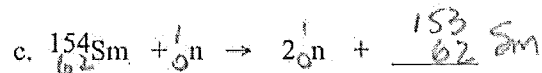
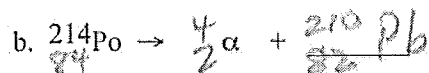
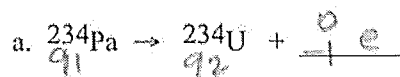
b. the beta decay (negatron) of Cobalt-60



c. the gamma decay of Krypton-81



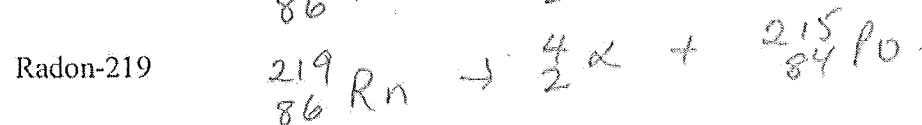
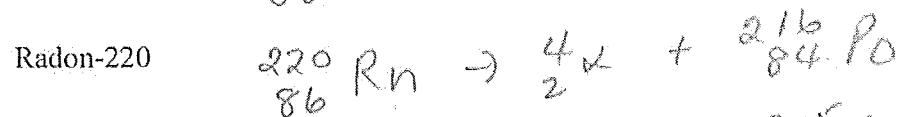
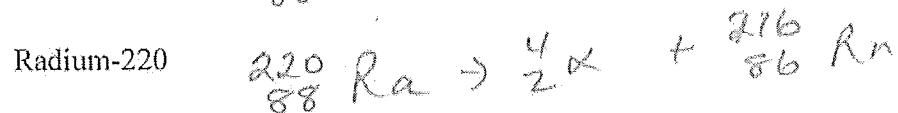
3. Complete the following nuclear equations



Nuclear Decay Worksheet

Write an equation for the following elements through the given emission type.

Alpha Decay:

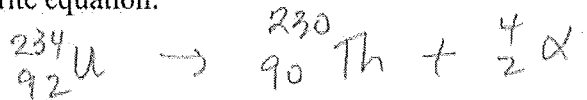


Beta Decay:



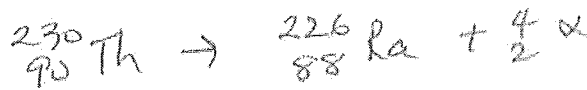
Name the type of emission and write equation:

Uranium-234 to Thorium-230



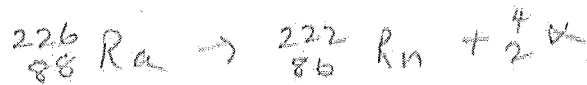
alpha

Thorium-230 to Radium-226



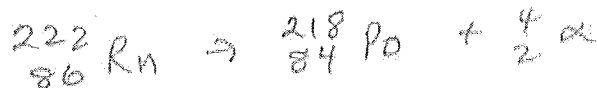
α

Radium-226 to Radon-222



α

Radon-222 to Polonium-218



α

Polonium-218 to Lead-214



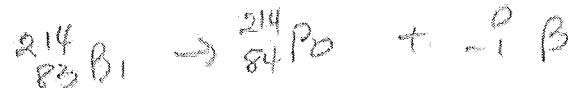
α

Lead-214 to Bismuth-214



β

Bismuth-214 to Polonium-214



β

Polonium-214 to Lead-210



α

Lead-210 to Bismuth-210



β

Bismuth-210 to Polonium-210



β

Polonium-210 to Lead-206



α

Look at these eleven steps, what is this sequence called?

Radioactive decay (p293)

Worksheet- Nuclear Decay

1. Instructions: Fill in the table below for each type of decay- alpha (α), beta (β), and gamma (γ)

Parent Isotope	Particle emitted	New, Daughter isotope	Alpha, Beta, or gamma Decay?	# of protons lost or gained by "parent"	Change in mass number
a. ${}_{88}^{226}\text{Ra} \rightarrow$	${}_{2}^{4}\text{He} +$	${}_{86}^{222}\text{Rn}$	Alpha	Lost 2	minus 4
b. ${}_{84}^{214}\text{Po} \rightarrow$	${}_{2}^{4}\text{He} +$	${}_{82}^{210}\text{Pb}$	α	- 2	- 4
c. ${}_{20}^{47}\text{Ca} \rightarrow$	${}_{-1}^{0}\text{e}^{-} +$	${}_{21}^{47}\text{Sc}$	β	+ 1	0
d. ${}_{64}^{148}\text{Gd} \rightarrow$	${}_{2}^{4}\text{He} +$	${}_{62}^{144}\text{Sm}$	α	- 2	- 4
e. ${}_{6}^{14}\text{C} \rightarrow$	${}_{-1}^{0}\text{e}^{-} +$	${}_{7}^{14}\text{N}$	β	+ 1	0
f. ${}_{64}^{148}\text{Gd} \rightarrow$	${}_{0}^{0}\gamma +$	${}_{64}^{148}\text{Gd}$	γ	0	0

2. What changes take place in the nucleus when an alpha particle is emitted?

lose $\frac{1}{2}\text{He}$ 2p, 2n

3. What is the identity of an alpha particle?

He nucleus

4. What changes take place in the nucleus when a beta particle is emitted?

neutron into proton, \bar{e} released.

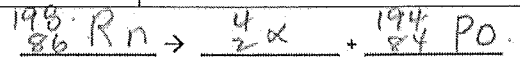
5. Which particle is associated with beta decay?

e^{-}

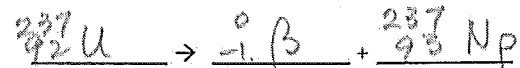
6. Fill in the missing parts of these nuclear reactions: (numbers & elements)

a) ${}_{19}^{40}\text{K} \rightarrow$	${}_{-1}^{0}\text{e} +$	${}_{20}^{40}\text{Ca}$	b) ${}_{90}^{230}\text{Th} \rightarrow$	${}_{2}^{4}\text{He} +$	${}_{88}^{226}\text{Ra}$	c) ${}_{14}^{35}\text{Si} \rightarrow$	${}_{-1}^{0}\text{e} +$	${}_{15}^{35}\text{P}$	
d) ${}_{92}^{238}\text{U} \rightarrow$	${}_{2}^{4}\text{He} +$	${}_{90}^{234}\text{Th}$	e) ${}_{53}^{110}\text{I} \rightarrow$	${}_{2}^{4}\alpha +$	${}_{51}^{106}\text{Sb} +$	${}_{0}^{0}\gamma$	f) ${}_{56}^{140}\text{Ba} \rightarrow$	${}_{-1}^{0}\beta +$	${}_{57}^{140}\text{La}$

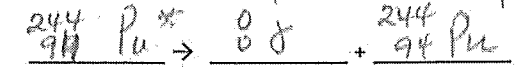
7. Write equations for: a) The alpha (α) decay of radon-198



b) The beta (β) decay of uranium-237



c) Plutonium-244 undergoes gamma decay



9. Does the identity of an atom change during radioactive decay? Why or why not?

If proton # changes yes

10. How does the "Law of Conservation of Matter" explain how you write nuclear equations?

total # protons left = right
total # ntr " = "

11. List the 3 types of radiation (α , β , γ) in order from least penetrating to most penetrating.

$\alpha < \beta < \gamma$

12. Why would you expect alpha particles to be less able to penetrate materials than beta?

Bigger

13. Why are alpha particles and beta particles deflected in opposite directions in an electric field? Why are gamma rays not deflected?

+ charge \rightarrow no charge
 \searrow - charge