Name: __KEY__   Date: _____   Period: _____

Radioactivity Worksheet

1. State the number of neutrons and protons in each of the following nuclei:

   a. $_1^2H$: __neutrons = 1   protons = 1__
   b. $_6^{12}C$: __neutrons = 6   protons = 6__
   c. $_{26}^{56}Fe$: __neutrons = 30   protons = 26__
   d. $_{79}^{197}Au$: __neutrons = 118   protons = 79__

2. The three types of radioactive emissions are called alpha (α), beta (β) and gamma (γ) radiation. Complete the table below with the correct information about each type.

	Charge	Atomic Symbol	Can Be Stopped By
Alpha	+2	$_2^4He$	paper
Beta	−1	$_{-1}^0e$	aluminum
Gamma	0	$_0^0\gamma$	lead

3. Which of the three radioactive emissions (α, β, γ) best fit the following statements? Write the correct symbol/s on the lines.

   a) These emissions are charged. __α, β__

   b) This emission is the most massive (heaviest). __α__

   c) This emission is the most charged. __α__

   d) This emission is most dangerous outside of the body. __γ__

   e) This emission is stopped by thin paper or a few centimeters of air. __α__

   f) This emission can travel through paper, but is stopped by aluminum. __β__

   g) This emission can travel through fairly thick lead. __γ__

4. Which type of radiation – alpha, beta, or gamma:
   a. Results in the greatest change in atomic number? Why?

   __Alpha – changes by 2__

   b. Results in the least change in atomic number? Why?
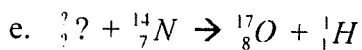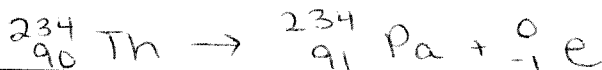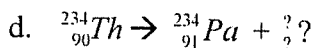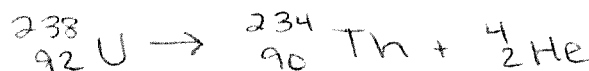
   __Gamma – no change in atomic number__

c. Produces the greatest change in mass number? Why?
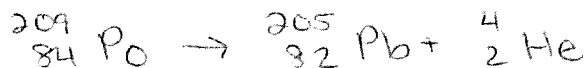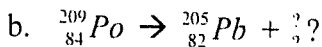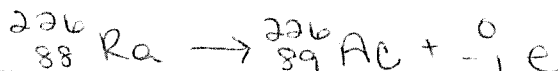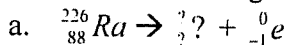
alpha - changes mass number by 4

d. Produces the least change in mass number? Why?

Beta & gamma - no change in mass number

5. Complete the following nuclear reactions:

   a. $^{226}_{88}Ra \rightarrow \ ^{?}_{?}? + \ ^{0}_{-1}e$

   $^{226}_{88}Ra \rightarrow \ ^{226}_{89}Ac + \ ^{0}_{-1}e$

   b. $^{209}_{84}Po \rightarrow \ ^{205}_{82}Pb + \ ^{?}_{?}?$

   $^{209}_{84}Po \rightarrow \ ^{205}_{82}Pb + \ ^{4}_{2}He$

   c. $^{238}_{92}U \rightarrow \ ^{?}_{?}? + \ ^{4}_{2}He$

   $^{238}_{92}U \rightarrow \ ^{234}_{90}Th + \ ^{4}_{2}He$

   d. $^{234}_{90}Th \rightarrow \ ^{234}_{91}Pa + \ ^{?}_{?}?$

   $^{234}_{90}Th \rightarrow \ ^{234}_{91}Pa + \ ^{0}_{-1}e$

   e. $^{?}_{?}? + \ ^{14}_{7}N \rightarrow \ ^{17}_{8}O + \ ^{1}_{1}H$

   $^{4}_{2}He + \ ^{14}_{7}N \rightarrow \ ^{17}_{8}O + \ ^{1}_{1}H$
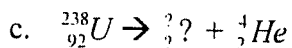
6. When isotope bismuth-213 emits an alpha particle:

   a. Write out the nuclear equation:

   $^{213}_{83}Bi \rightarrow \ ^{4}_{2}He + \ ^{209}_{81}Tl$
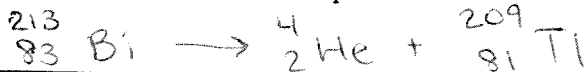
   b. What new element results if the isotope, instead, emits a beta particle?

   Polonium