

Lesson 167: Nuclear Decay

Chemistry with Lab

- Fill in the table below and then use it to figure out what is happening during each type of decay – alpha, beta, and gamma.

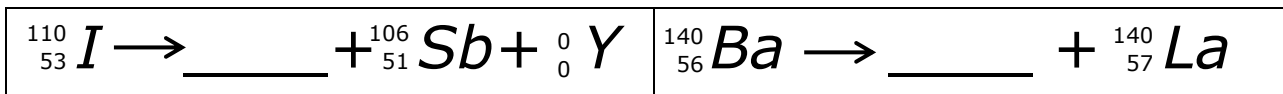
Parent Isotope	Particle Emitted	New, Daughter Isotope	Alpha, Beta, or Gamma Decay?	# of protons lost or gained by "parent"	Change in mass number
$^{226}_{88}\text{Ra} \rightarrow$	$^4_2\text{He} +$	$^{222}_{86}\text{Rn}$	Alpha	Lost 2	Minus 4
$^{214}_{84}\text{Po} \rightarrow$	$^4_2\text{He} +$	$^{210}_{82}\text{Pb}$			
$^{47}_{20}\text{Ca} \rightarrow$	$^0_{-1}\text{e}^- +$	$^{47}_{21}\text{Sc}$			
$^{148}_{64}\text{Ra} \rightarrow$	$^4_2\text{He} +$	$^{144}_{62}\text{Sm}$			
$^{14}_6\text{C} \rightarrow$	$^0_{-1}\text{e}^- +$	$^{14}_7\text{N}$			
$^{148}_{64}\text{Gd} \rightarrow$	$^0_0\gamma +$	$^{148}_{64}\text{Gd}$			

- What changes take place in the nucleus when an alpha particle is emitted?
- What is the identity of an alpha particle?
- What changes take place in the nucleus when a beta particle is emitted?
- Which particle is associated with beta decay?
- Fill in the missing numbers and elements from these nuclear reactions:

$^{40}_{\text{—}} \text{—} \rightarrow ^0_{-1}\text{e} + ^{40}_{20}\text{Ca}$	$\text{—} \rightarrow ^4_2\text{He} + ^{226}_{88}\text{Ra}$
$^{35}_{14}\text{Si} \rightarrow ^0_{-1}\text{e} + \text{—}$	$^{238}_{92}\text{U} \rightarrow + ^4_2\text{He} + \text{—}$

Lesson 167: Nuclear Decay (cont.)

Chemistry with Lab



7. a) Show the alpha decay of radon-198

b) Show the beta decay of uranium-237

8. Plutonium-244 undergoes gamma decay. What are the products of this reaction?

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

10. List the 3 types of radiation (alpha, beta, gamma) in order from least penetrating to most penetrating.

11. What is the difference between nuclear fusion and nuclear fission?