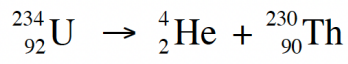
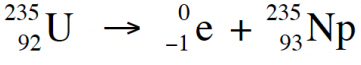
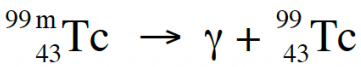
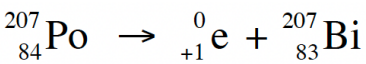
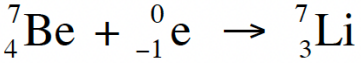
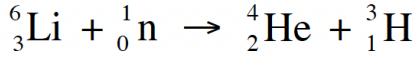
CH 222 Nuclear Chemistry Guide

$$ {}^{A}_{Z}X^{n+/-} $$

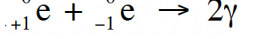
X = element symbol
n = element charge (if any)
Z = atomic number (number of protons)
A = mass number (number of protons + neutrons)

Types of Radiative Processes

Alpha Decay:	Lose 	*Example:* 	*Note 1*
Beta Decay:	Lose 	*Example:* 	*Note 4*
Gamma Decay:	Emit Energy	*Example:* 	*Note 2*
Positron Emission:	Lose 	*Example:* 	*Note 3, 4*
Electron Capture:	Gain 	*Example:* 	*Note 4*
Neutron Capture:	Gain 	*Example:* 	

Note 1: The alpha particle is actually charged, having a charge of +2. This makes the other product have a negative -2 charge (conservation of charge), but the charges of the ions are rarely considered in nuclear chemistry.

Note 2: Gamma emissions have energies in the range of roughly 1 MeV ($1.6*10^{-13}$ J).

Note 3: A positron is an *antielectron* (a particle of antimatter) - when a positron and an electron collide, they annihilate each other ().

Note 4: The beta decay process produces an antineutrino in addition to the other products, while the positron emission and electron capture processes result in the creation of a neutrino. This is due to the conservation of spin concept, but you need not concern yourself about neutrinos in *this* CH 222 class!