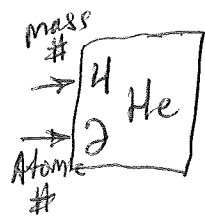


Nuclear Chem.

* As stated previously - unlike chem. rxns that only involve the sharing or transfer of electrons, radioactivity involves the loss or gain of energy & particles that change the elements involved into new elements.

- Unstable radioactive atoms emit radiation in the form of energy or particles (α , β , or γ)



(α) Alpha particles are often written as $\begin{matrix} 4 \\ 2 \end{matrix} \text{He}$ because the particles are made of 2 neutrons & 2 protons & thus have a 2+ charge

- Atoms that emit a α particle lose 4 from its mass & 2 from atomic #.

Beta particles (β) often written as β or e^- , as they represent the loss of 1 electron (1^-) or β^-

- Atoms that emit a e^- particle gain 1 atomic #.

Gamma radiation (γ) - are massless quanta of energy that usually coincide w/ α or β emission.
- account for most energy lost in radioactive decay.

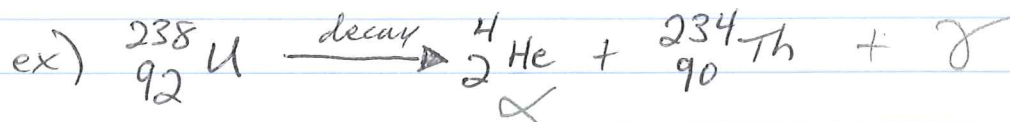
* Each of these decay types is used as the nucleus' way of reaching stability

Nuclear Equations

- Just like in chemical rxns, we can summarize & abbreviate how nuclear rxns take place.

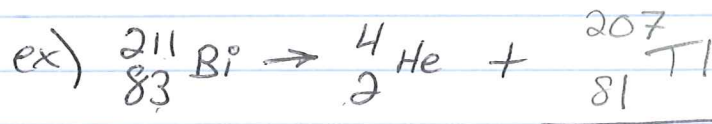
① Alpha (α) Decay

- when an α particle is released, the atomic # decreases by 2 & mass decreases by 4



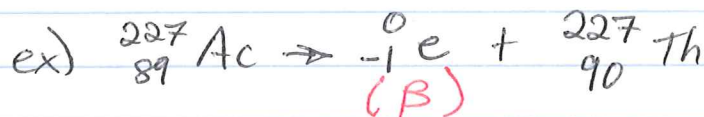
* Notice that $\frac{238}{92} = \frac{4 + 234}{2 + 90}$, they must balance

& new atomic # of 90, tells us that $\text{U} \rightarrow \text{Th}$

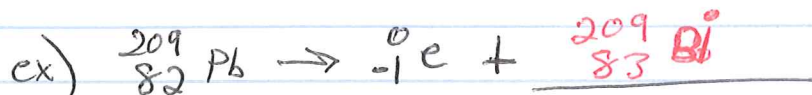


2. Beta (β) decay

- when a β particle is released/emitted, the atomic # increases by 1 & mass is unchanged



* Notice that $\frac{227}{89} = \frac{0 + 227}{-1 + 90}$

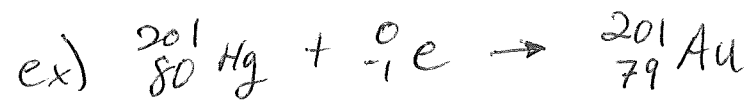


3. Beta (β) capture

- Occurs when a β particle combines w/a proton (p^+) to form a neutron (n^0).

- Atomic # decreases by 1 & mass is unchanged

3



* Notice that $\frac{201 + 0 = 201}{80 + -1 = 79}$

