Mon Apr 29

Finishing Ch 21

Strong force - force that holds protons + neutrons together in nucleus

Repulsive force -

Nuclei stable if strong force > repulsive force

N:P and decay types

- Decay type depends on location in band
- n-rich → β- decay
- p-rich → β^+ emission or e^- capture
- Z > 84 → α- decay

(1) N:P > stable ratio ⇒ neutron-rich decay will lose n

$${}^{1}_{0}n \rightarrow {}^{0}_{-1}\beta + {}^{1}_{1}p$$

(2) N:P < stable band ⇒ proton-rich decay will lose p + gain n

$${}^{1}_{1}p \rightarrow {}^{1}_{0}n + {}^{0}_{+1}\beta$$

↖ positron: opp charge of beta, same mass

positron emission

$${}^{1}_{1}p + {}^{0}_{-1}e \rightarrow {}^{1}_{0}n$$

electron capture

going in ⇒ e

coming out ⇒ β

Z (atomic #) above 84, too big to be stable

(3) Z > 84 ⇒ α emission

Radioactive Decay Series

- Some radioactive nuclei cannot stabilize by undergoing only one nuclear transformation
- They undergo a series of decays until they form a stable nuclide (often a nuclide of lead)

Other factors of stability

- Even #s of neutrons and protons tend to be more stable
- Magic numbers of 2, 8, 20, 28, 50, 82 or 126 tend to be more stable
- Li, Be, B low stability
- Fe most stable, very abundant