

$${}^6_{14}\text{C} \rightarrow {}^0_{-1}\text{e}^- + {}^2_{14}\text{N}$$

$${}^6_{14}\text{C} + {}^0_{+1}\text{e} \rightarrow {}^7_{14}\text{N}$$

Above belt

Beta decay $A \# \uparrow \downarrow 1$

How do we get $A \# \downarrow 1$?

$${}^{37}_{20}\text{Ca} \rightarrow {}^0_{+1}\text{e}^+ + {}^{37}_{19}\text{K}$$

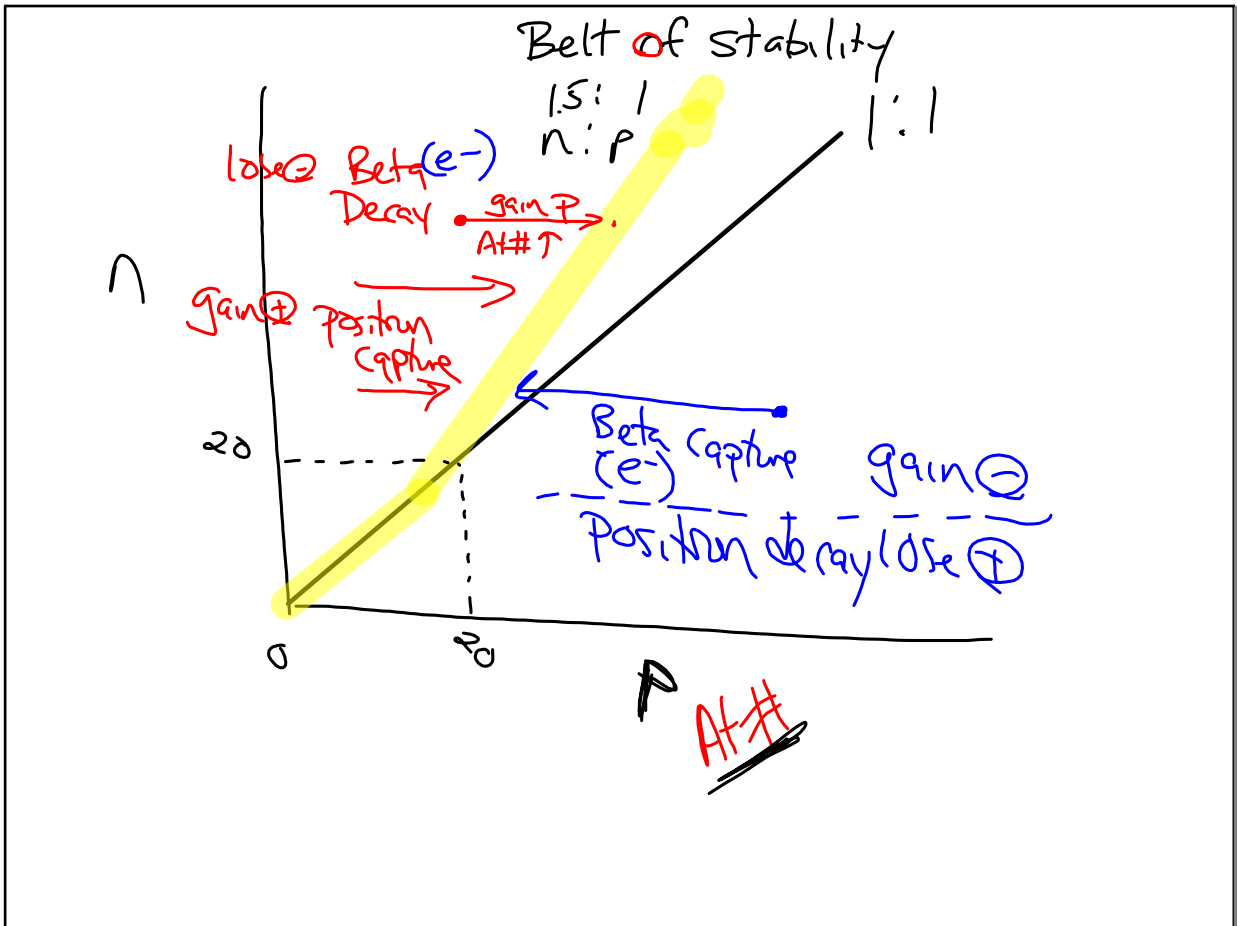
Positron Decay

$${}^{37}_{20}\text{Ca} + {}^0_{-1}\text{e} \rightarrow {}^{37}_{19}\text{K}$$

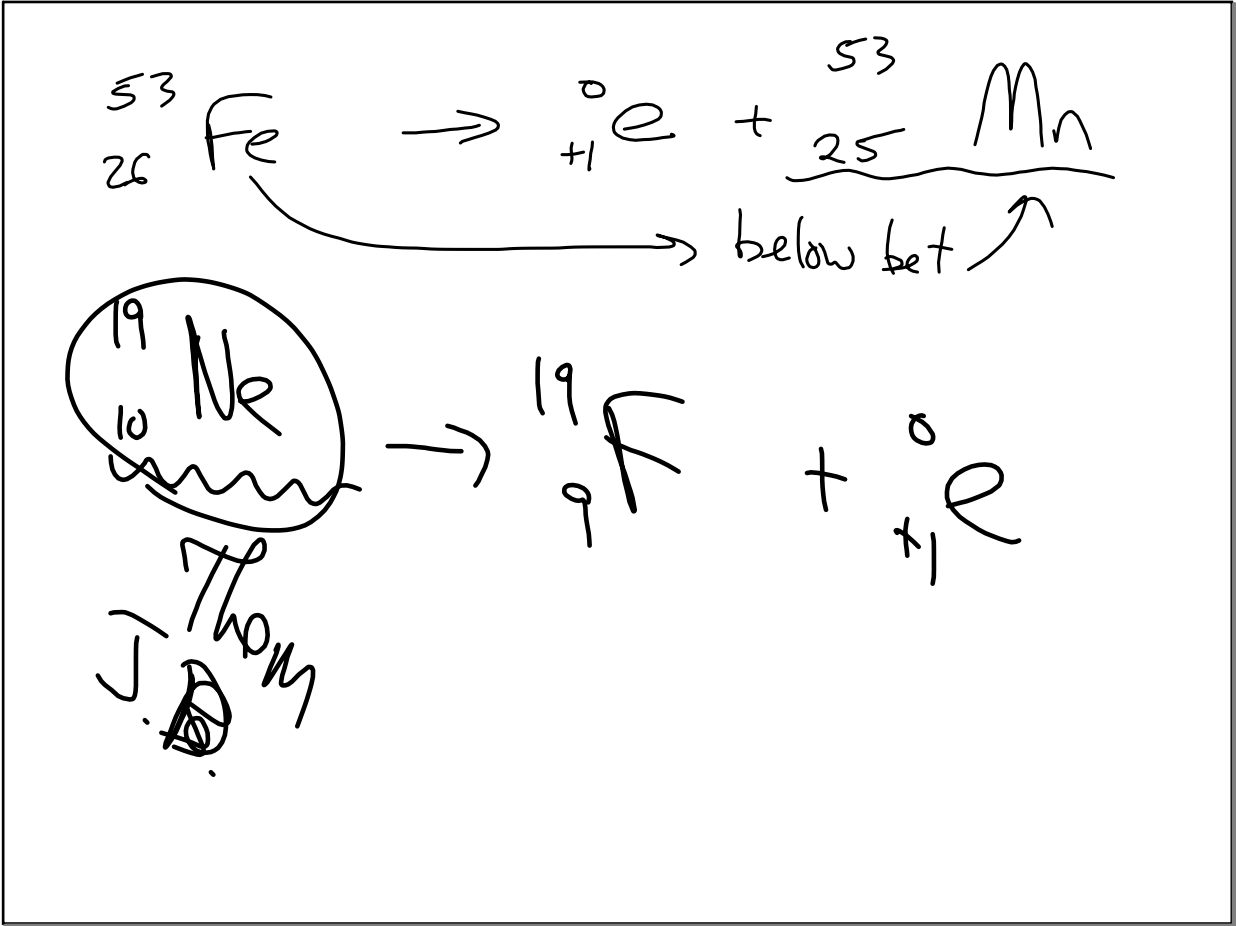
Electron Capture

$A \# \downarrow 1$

May 20-8:24 AM



May 20-9:01 AM



May 20-9:07 AM

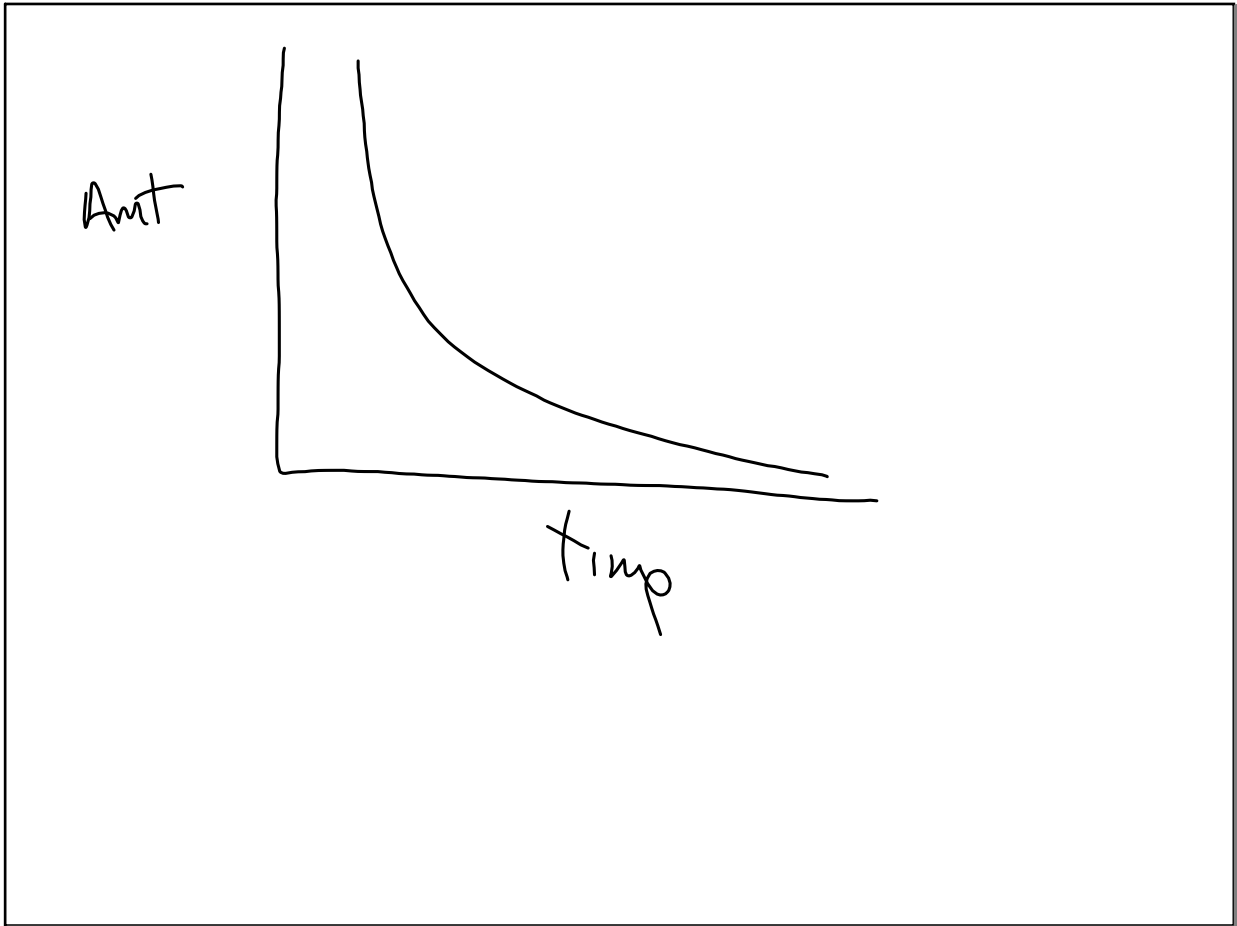
Half Life - Amount of time

it takes for an element to decay to half of its mass.

$$\ln A_t = -kt + \ln A_0$$

(Annotations for the equation above):
 - $\ln A_t$: present amount
 - $-kt$: rate constant (k) times time (t)
 - $\ln A_0$: start amount

May 20-9:14 AM



May 20-9:38 AM

$100 \xrightarrow{①} 50 \xrightarrow{②} 25 \xrightarrow{③} 12.5$


$t_{1/2} = \text{half life}$ (5 yrs)

How long will it take for a substance to decay to $\frac{1}{8}$ of its original amount.

May 20-9:38 AM

Fission vs Fusion

Nuclear Fission



Breaks down
Mass decreases.

Fusion

Welding

Connect 2 small pieces Sg


big piece

Very Hot

Surface of Sun

May 20-9:43 AM

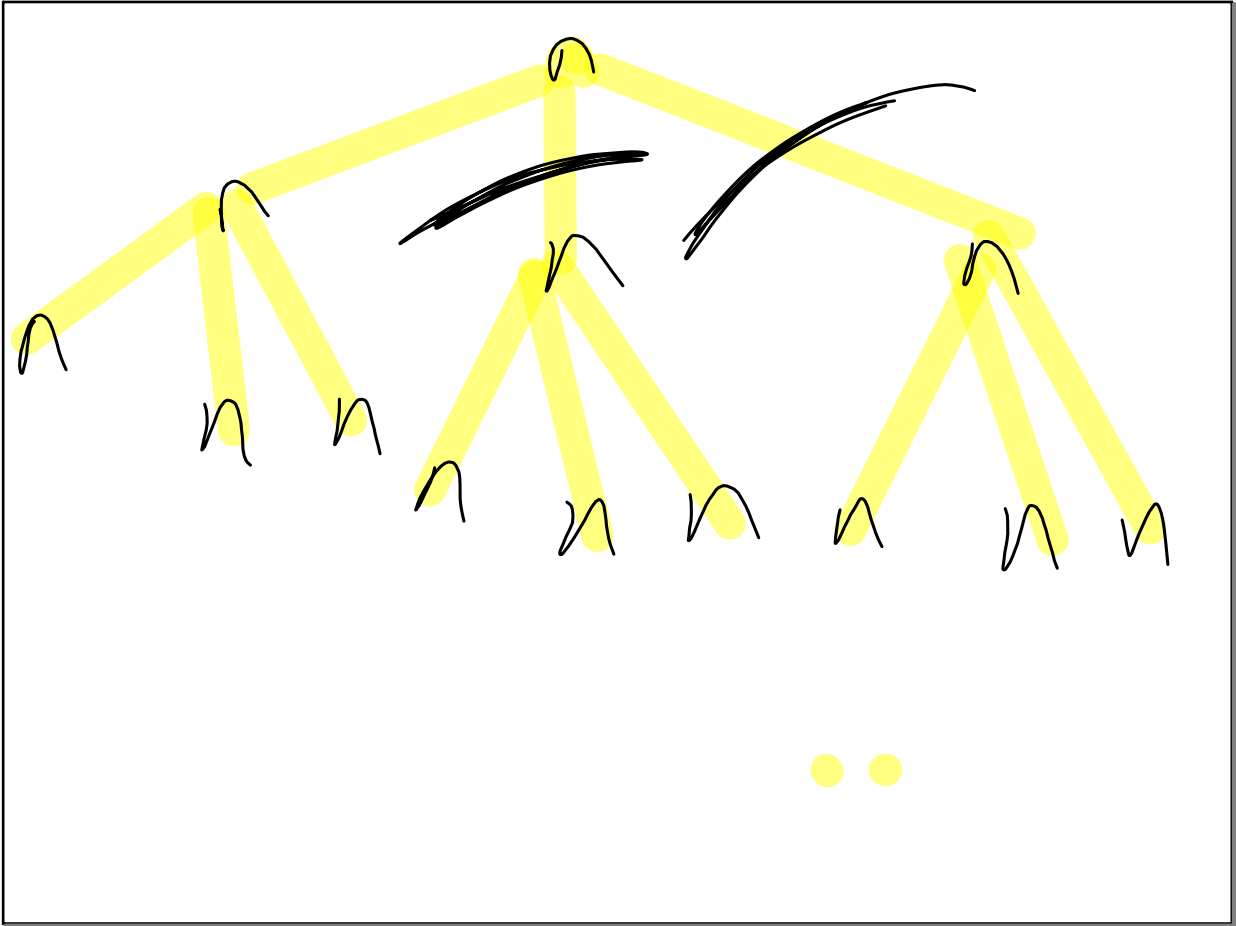
Nuclear Fission — Power Plant

$${}_{92}^{235}\text{U} + {}_0^1\text{n} \rightarrow {}_{56}^{140}\text{Ba} + {}_{36}^{93}\text{Kr} + 3{}_0^1\text{n}$$


+ Energy

Produces

May 20-9:47 AM



May 20-9:53 AM

Nuclear Power plant

- Fuel ^{235}U or ^{238}U or ^{239}U

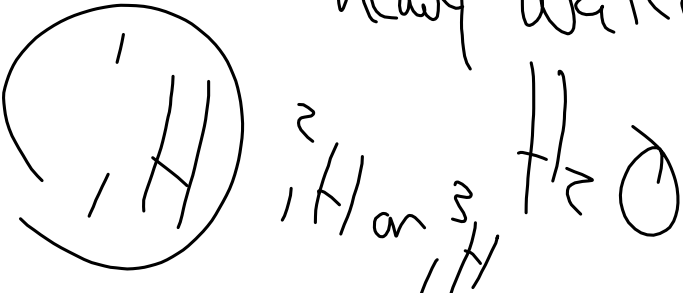
- Control Rods → absorb extra neutrons
Bar Cd takes them out of the eqn

A hand-drawn diagram of three control rods. Each rod is a vertical rectangle labeled 'CR'. Below each rod is a horizontal line with a downward-pointing arrow, representing a neutron being absorbed.

May 20-9:54 AM

Moderator → slow the neutrons down

graphite or heavy water

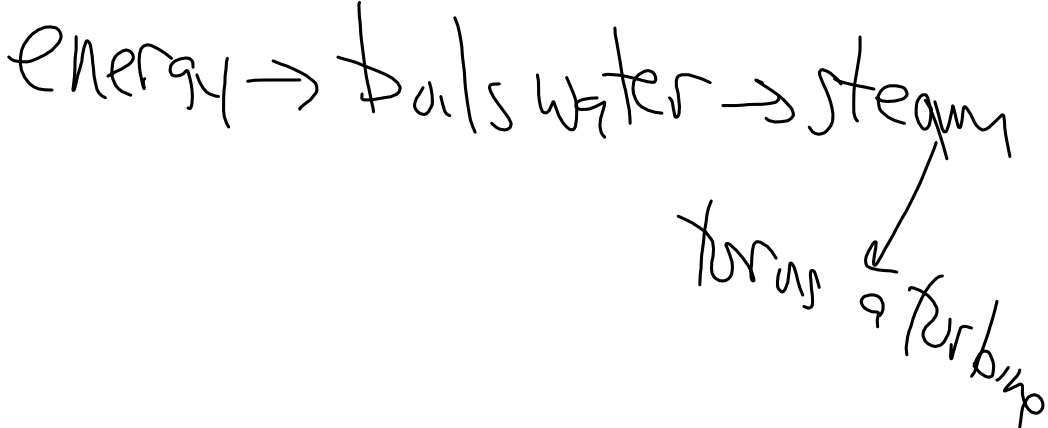


May 20-9:59 AM

Tea pot

energy → boils water → steam

turbine ← a turbine



May 20-10:01 AM

Containment dome

6' \rightarrow 4' Thick

Concrete + steel
encapsulates radiation.
No leaks.

May 20-10:02 AM

γ 23 + 24

May 20-10:04 AM