

PS21-1

(14) ${}^{41}_{20}\text{Ca} + {}^0_{-1}\text{e} \rightarrow {}^{41}_{19}\text{K}$

${}^{41}_{19}\text{K} \rightarrow {}^0_{+1}\text{e} + {}^{41}_{18}\text{As}$

"capture" reactant side \rightarrow "decay" product side

Apr 13-7:28 AM

(22) ${}^{210}\text{Pb} \xrightarrow{t_{1/2} = 22.3 \text{ yrs}} {}^{206}\text{Hg} \rightarrow \text{At}$

$A_0 = 7.5 \text{ g}$

$t = 17.5 \text{ yrs}$

$k = \frac{0.693}{t_{1/2}} = \frac{0.693}{22.3} = 0.0311 \text{ yr}^{-1}$

Start 7.5g Pb

Now have 4.35g Pb

* 3.15g Pb \rightarrow Hg

3.15g Pb $\left(\frac{206 \text{ Hg}}{210 \text{ Pb}} \right) = 3.09 \text{ g Hg}$

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

$\ln A_t = (-0.0311)(17.5) + \ln(7.5)$

$A_t = 4.35 \text{ g Pb}$ have now.

99%

Apr 13-8:00 AM

Fission → Produces ENERGY

Chain rxn → product is also a reactant

(8g) Subcritical mass → Not enough to react
SAFE!

(10g) Critical mass - minimum mass needed to
keep a chain rxn going

^{SUPA} Super critical mass - causes a Nuclear EXPLOSION
iGo Boom!

Atomic Bomb.

The diagram shows a cylindrical core of an atomic bomb. On the left, a smaller section is labeled 'Subcritical' with a mass of 8. An arrow points to the right, where a larger section is labeled 'Critical' with a mass of 16. To the right of the core, there is a circled '16' and the text 'Critical = 16'.

Apr 13-8:20 AM

FUSION less mass ⇒ greater mass

Needs heat (LOTS!) to produce energy.

SUN ${}^1_1\text{H} + {}^2_1\text{H} \rightarrow {}^4_2\text{He}$

Lowest T = 40,000,000 K

Cold Fusion - 3,000,000 K

Apr 13-8:57 AM

Radiation Time, Distance, Shielding.

RAD - Radiation Absorbed Dose

RBE - Relative Biological Effectiveness

$$\text{REM} = \text{RAD} * \text{RBE}$$

Röntgen Equivalent for Man

Apr 13-9:02 AM