30b

$^{14}_{7}N + {}^{1}_{1}H \rightarrow {}^{11}_{6}C + {}^{4}_{2}He$ ←

$^{1}_{1}p$

α

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Radioactive Decay

1st ORDER RXNS!

MAX :)

Half Life → time for ½ (mass) to decompose

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

$t_{1/2} = \frac{0.693}{k}$

½ A_0

original amount.

A_t = how much you have

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A_0 1 g ^{90}Sr. A_t 0.953 g after (t) 2 yrs.

(a) Find $t_{1/2}$.

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

$\ln 0.953 = -K(2) + \ln 1$

$K = 0.0241 \text{ yr}^{-1}$

$\frac{t_{1/2}}{1} = \frac{0.693}{K}$

$\frac{K}{1} = \frac{0.693}{t_{1/2}}$

28.8 yr

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How much remains after 5 yrs.

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

$\ln A_t = -(0.0241)(5) + \ln 1$

$A_t = 0.8869 \text{ g}$

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Rock has $\frac{0.257\,mg\ ^{206}Pb}{1\,mg\ ^{238}U}$

$t_{1/2} = 4.5\times10^{9}\,yr$

$^{238}U \rightarrow ^{206}Pb$ stable

^{238}U stable

TOTAL = 1.257 mg (mass now U + Pb) ?

MASS RATIO TO CONVERT U → Pb

A_0 for ^{238}U – original mass just ^{238}U

$1\,mg + \frac{0.257\,mg\ Pb}{1}\left(\frac{238\ U}{206\ Pb}\right) = 1.297\,mg\ ^{238}U$ now

mole ratio

A_0

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

$\ln 1 = -\left(\frac{0.693}{4.5\times10^{9}}\right)t + \ln 1.297$

$1.7\times10^{9}\,yr$

$k = \frac{0.693}{4.5\times10^{9}}$

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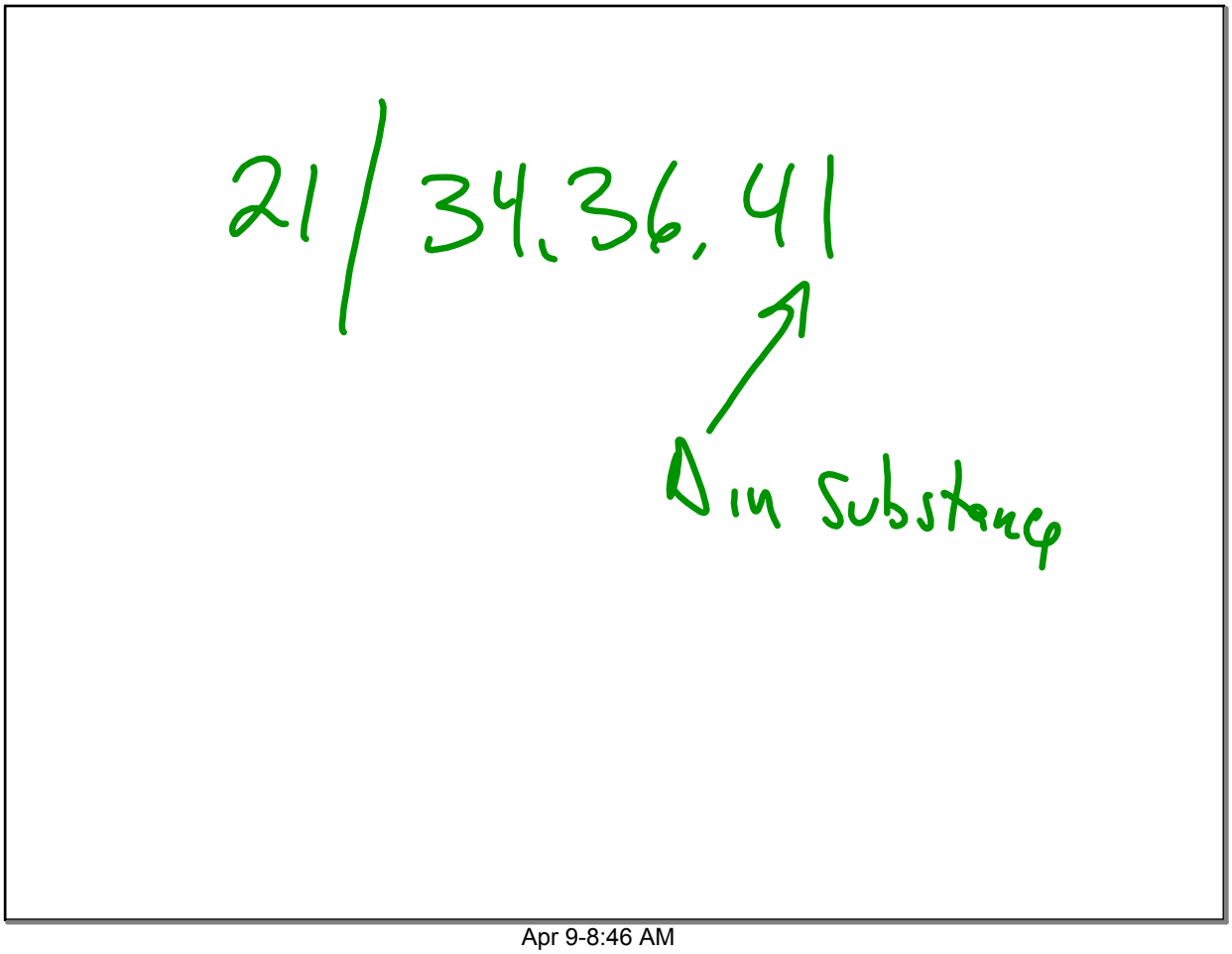

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