

# Gen Chem w/ Doc M

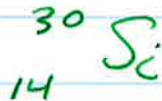
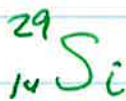
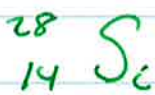
Today: 4/12 Finish Chp 19

Over Easter Break - Visit Final Exams Review  
on course website 2<sup>nd</sup> semester Exam

Tuesday: 4/18 Review in Hitchcock 108 5-6:30 pm

Wednesday: 4/19 Start Chp 11 Liquids + solids

Thursday: 4/20 Last Lab: Expt 12



92.23%

4.67%

3.10%

27.976927 amu

28.976495

29.973770

Isotope mass

u  
g/mol

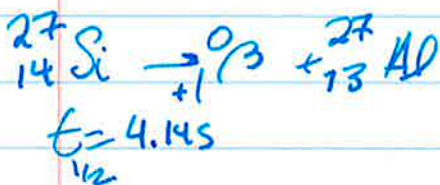
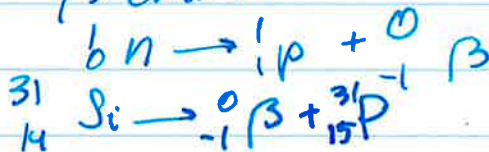


too few neutrons

$\beta^+$ -emissions  
(electron capture)

too many neutrons

$\beta^-$ -emitter



electron capture



1<sup>st</sup> order kinetics

$$\ln \left( \frac{N_0}{N_t} \right) = kt$$

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

$N_0, N_t$

conc

moles

mass

percent  
fraction

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

$t_{1/2}$

${}^{67}\text{Ga}$  is used to diagnose tumors. It has a  $t_{1/2}$  of 77.9 hr. If a 0.15 mg dose is used, what mass remains after 2 weeks?

$\hookrightarrow 336 \text{ hrs}$

$$k = \frac{0.693}{77.9 \text{ hr}} = 8.90 \times 10^{-3} \text{ hr}^{-1}$$

$$\ln \left( \frac{0.15}{N_t} \right) = 8.90 \times 10^{-3} \text{ hr}^{-1} \times 336 \text{ hr}$$

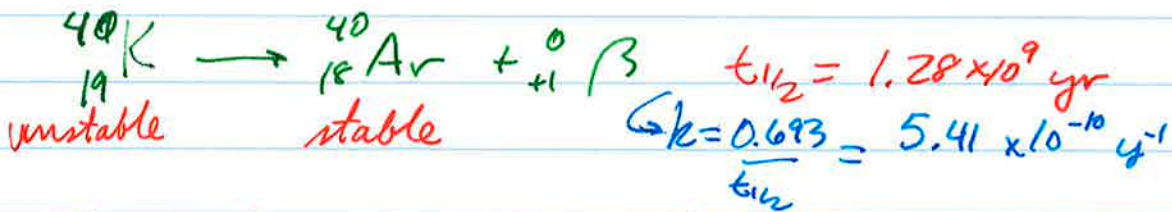
$$\ln\left(\frac{0.15}{N_t}\right) = 2.99$$

$$\frac{0.15 \text{ mg}}{N_t} = e^{2.99}$$

$$N_t = 7.6 \times 10^{-3} \text{ mg}$$

find ratio  $\Rightarrow \frac{N_0}{N_t} = 19.9$

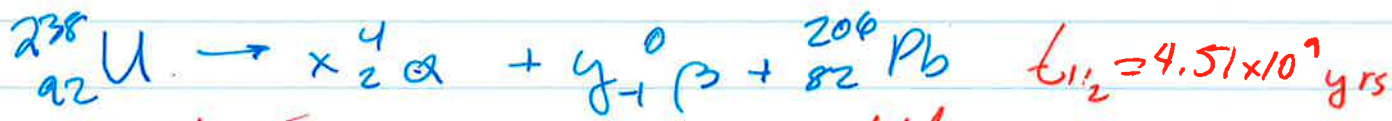
find percent left:  $\frac{N_t}{N_0} = 0.0502 = 5.02\%$



How old is a rock in which the ratio of  ${}^{40}_{19}\text{K}$  to  ${}^{40}_{18}\text{Ar}$  is 1:1.35?

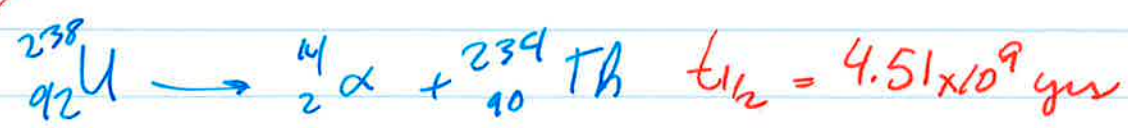
$$\ln\left(\frac{\text{Kr} + \text{Ar}}{\text{Ar}}\right) = \ln\left(\frac{2.35}{1}\right) = 5.41 \times 10^{-10} \text{ yr}^{-1} * t$$



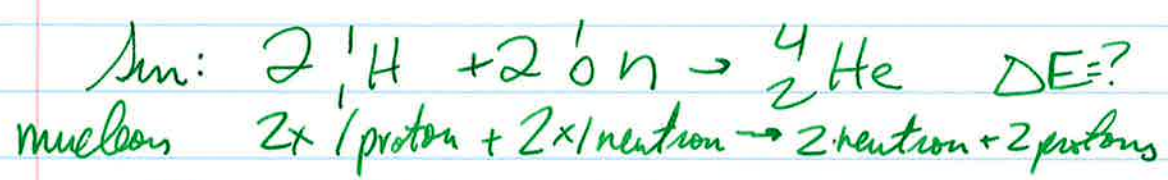


unstable

stable



$$\begin{aligned} x &= 8 \\ y &= 6 \end{aligned}$$



$$m_p = 1.0078 \text{ amu} \times 2 + m_n = 1.00866 \text{ amu} \times 2$$

$$m_{2p+2n} = 4.03188 \text{ amu}$$

$$M_{2\text{He}} = 4.002602 \text{ amu}$$

$$- M_{\text{He}2e} = 0.00110 \text{ amu} \times 2$$

$$M_{2\text{He}} = 4.000402 \text{ amu}$$

$$\Delta m = 4.03188$$

$$- 4.000402$$

$$0.03148 \text{ amu}$$

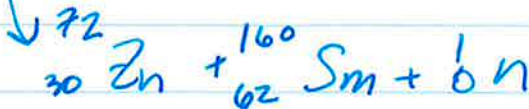
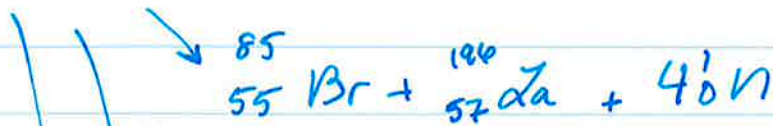
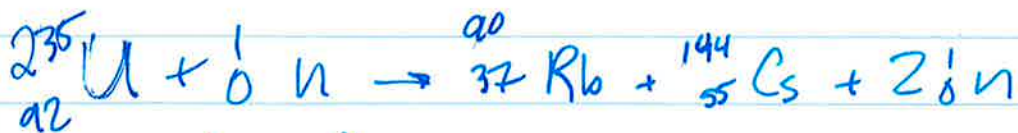
speed of light:  $3.0 \times 10^8 \text{ m/s}$

$$E = mc^2 \Rightarrow \Delta E = \Delta m c^2$$

$$= \frac{0.03148 \text{ g}}{\text{mol}} \left| \frac{\text{kg}}{1000 \text{ g}} \right| \frac{(3.0 \times 10^8)^2 \text{ m}^2}{\text{s}^2}$$

$$= 2.83 \times 10^2 \frac{\text{kg m}^2}{\text{s}^2 \text{ mol}}$$

$$= 2.83 \times 10^{17} \text{ J/mol} = 2.83 \times 10^9 \text{ kJ/mol}$$



other reactions