Joseph Specht

Homework 5

1)

Part	Decay Type	Unknown Parameter	T (MeV)
A	Alpha	Pb-206	5.408
B	Beta -	Cl-38	2.94
C	Beta +	Si-27	3.79
D	Electron Capture	Neutrino	.616
E	Neutron Emission	Xe-136	2.687
F	Proton Emission	H-1	-5.798
G	Internal Conversion	$Ni\text{-}60^{+}$	.11667

2) T of alpha = 4.197 MeV

T of Th = 0.0718 MeV

3) T of Ground alpha = 5.686 MeV

T of Excited alpha = 5.449 MeV

4) 213.0695737644884 amu

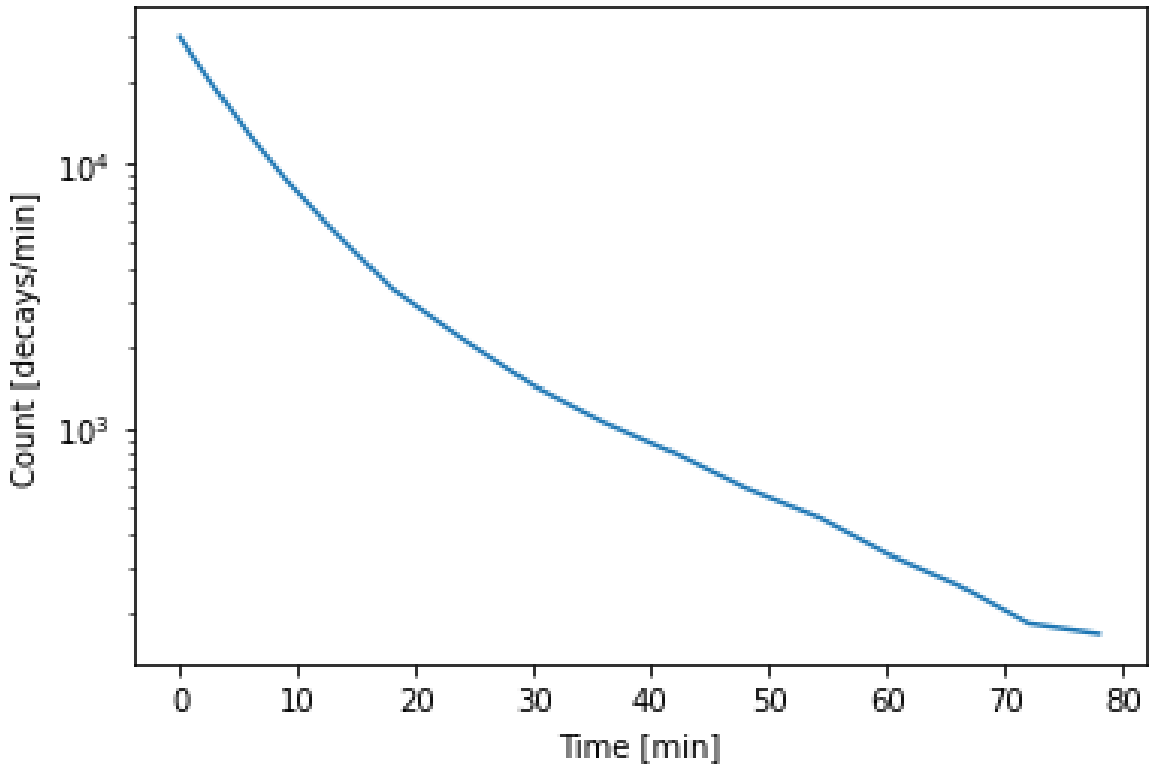
5) Lambda = 0.537 * 1/Ga

Mean Lifetime = 1.861 Ga

6) 721.0229 G

7a) Atoms of Na24 = 9.330e10

b) Atoms of U238 = 2.441e23



8a)

b) First lambda = 0.0152487234041110 * 1/min

Second lambda = 0.110684305618879 * 1/min

c) First Half life = 45.456 min

Second Half life = 6.262 min

d) First initial counts/min = 548.613

Second initial counts/min = 29221.386

9) For this to be true, the derivative of the whole expression

$N1(t) + N2(t) + N3(t) = N1(0) + N2(0) + N3(0)$ has to be equal to 0.

These derivatives are given by the following.

$dN1(t)/dt = -lambda\_1*N1(t)$

$dN2(t)/dt = -lambda\_2*N2(t) + lambda\_1 * N1(t)$

$dN3(t)/dt = lambda\_2*N2(t)$

The time derivatives of $N1(0) = N2(0) = N3(0) = 0$ because all of these values are either 0, in the cases of N2(0) and N3(0), or constants, in the case of N1(0).

Plugging these expressions into $d/dt(N1(t) + N2(t) + N3(t) = N1(0) + N2(0) + N3(0))$, we get

$-lambda\_1*N1(t) -lambda\_2*N2(t) + lambda\_1 * N1(t) + lambda\_2*N2(t) = 0 + 0 + 0$, which simplifies to

$0 = 0$

As the derivates with respect to time for each side are both 0, we can conclude that neither side changes in number over time.

10) N(t) is the same at every time, so N(t) doesn't have a max.

11) 11735.694 years old