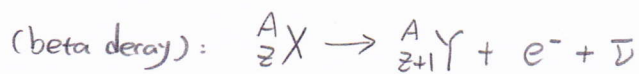
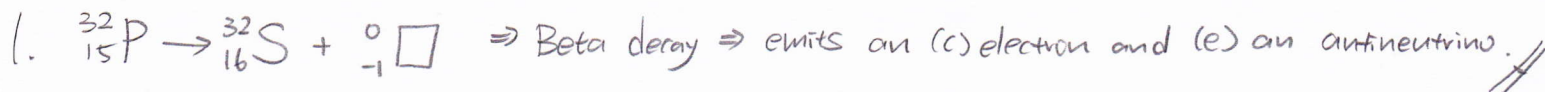


CH 30 Assigned Homework

PHYS 106
2014 Spring



2. (i) Initial activity = $R_0 = N_0\lambda$, half-life = $T_{1/2} = \frac{0.693}{\lambda}$

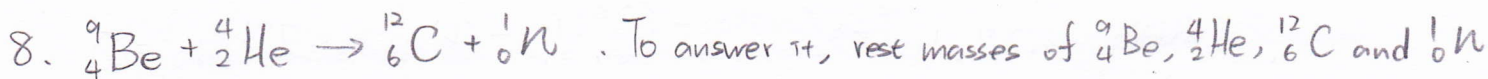
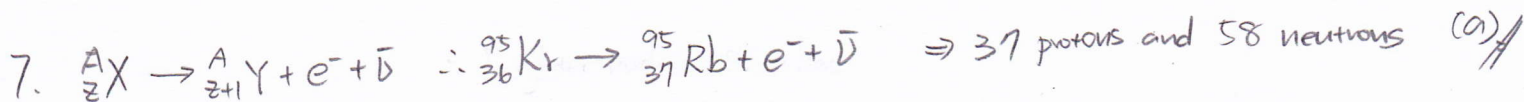
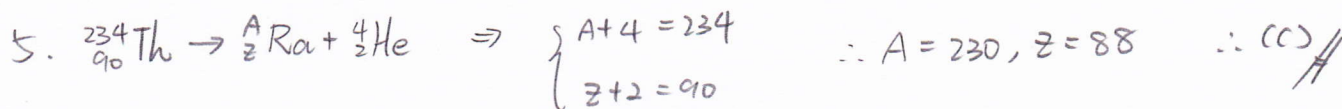
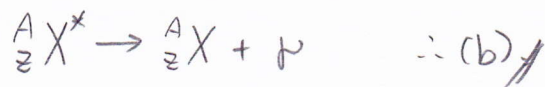
2 sample are the same $\Rightarrow \lambda$ are the same $\Rightarrow T_{1/2}$ must be the same.

(λ , the decay constant, depends on the nuclei.) \therefore (b)

(ii) After 5 half-lives $\Rightarrow t = 5T_{1/2} \therefore R = R_0 e^{-\lambda t} = R_0 e^{-5\lambda T_{1/2}}$

we know that $R_{0G} = 2R_{0H}$, $\lambda_G = \lambda_H$, and $T_{1/2G} = T_{1/2H} \therefore R_G = 2R_H \therefore$ (b)

3. In gamma decay, nucleus in an excited state decays to its ground state.



should be given: $M({}_{4}^9\text{Be}) = 9.012182 \text{ u}$, $M({}_{2}^4\text{He}) = 4.001506$, $M({}_{6}^{12}\text{C}) = 12.000000$

and $M({}_{0}^1\text{n}) = 1.008665$

$\therefore Q = [M({}_{4}^9\text{Be}) + M({}_{2}^4\text{He}) - M({}_{6}^{12}\text{C}) - M({}_{0}^1\text{n})] c^2$

$= (9.012182 + 4.001506 - 12.000000 - 1.008665) \cdot 931.494 \text{ (MeV/u)} = 4.68 \text{ MeV} //$

$$9. N = N_0 e^{-\lambda t}, \quad T_{1/2} = \frac{0.693}{\lambda} = 3.6 \text{ days} \Rightarrow \lambda = \frac{0.693}{3.6} = 0.1925 \text{ days}^{-1}$$

$$\text{after 2 weeks} = 14 \text{ days}, \quad N(14) = N_0 \cdot e^{-\lambda \cdot t} = N_0 \cdot e^{-0.1925 \times 14} = N_0 \cdot e^{-2.695}$$

$$\Rightarrow \frac{N(t=14)}{N_0} = e^{-2.695} = 0.0675 \approx \frac{1}{15} \quad \therefore (d) //$$

10. Beta decays of protons and neutrons:



(b)(c) //