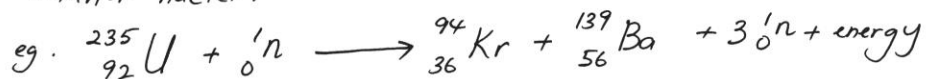


Sem 1 (2009/2010) : Nuclear Reactions

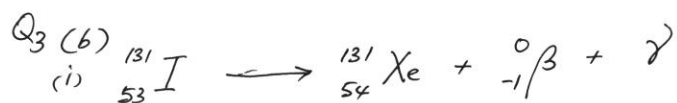
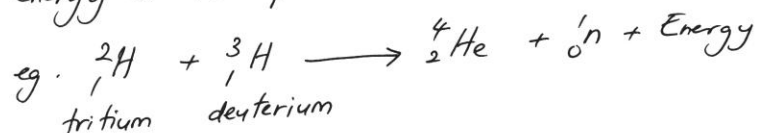
Q₃ (a) How does nuclear fission differ from nuclear fusion?

In nuclear fission, the atomic nuclei breaks apart into smaller nuclei.



Usually a smaller nuclei (${}_0^1\text{n}$) is used to bombard a heavy nuclei (${}_{92}^{235}\text{U}$). This results in the breaking up of the large/heavy nuclei into smaller daughter nuclei (ie ${}_{36}^{94}\text{Kr}$ & ${}_{56}^{139}\text{Ba}$ - daughter nuclei) and releasing energy in the process.

In nuclear fusion, small unstable nuclei join together to form a larger and more stable nuclei and releasing energy in the process.



(ii) $\ln \frac{N_0}{N_t} = kt$; $k = \frac{\ln 2}{t_{1/2}}$

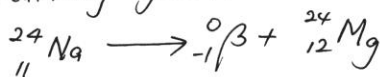
$$\left. \begin{array}{l} N_0 = 100 \\ N_t = 10 \\ t_{1/2} = 8.7 \text{ day} \end{array} \right\} \ln \left(\frac{100}{10} \right) = \left(\frac{\ln 2}{8.7} \right) t$$

$$t = 28.89 \text{ days}$$

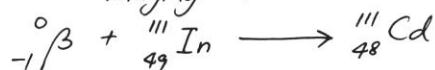
$$t = 28.9 \text{ days}$$



Q₃ (c) (i) Circulatory system:



Imaging tumors:



①/2

Sem 1 (2009/2010) : Nuclear Reactions

Q3(c)(ii) Total time, $t = (50 + 12)$ hours
 $= 62$ hours

$$\left. \begin{array}{l} t_{1/2} = 15h \\ t = 62h \\ \frac{N}{N_0} = ? \end{array} \right\} \ln\left(\frac{N_0}{N}\right) = kt$$

$$= \left(\frac{\ln 2}{15h}\right)(62h)$$

$$= 2.865$$

$$\frac{N_0}{N} = 17.59$$

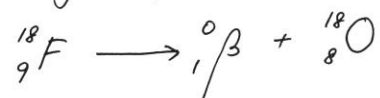


$$\therefore \frac{N}{N_0} = 0.0570 \text{ (Ans)}$$

Q3c(iii) Production of ${}^18_9\text{F}$



Decay of ${}^{18}_9\text{F}$



Prepared by
V. Manoharan
vmano@usm.my
manov1955@yahoo.com
04-6533888 ext 3566