HW #12

43-43

QF : slow neutrons : ≈ 3
~~fast~~ " : up to 10

$$50 \times \left(\frac{10}{3}\right) = 167 \text{ Rad}$$

43-51

Effective Dose (per year) for an adult of 50kg $= 2\times10^{-9}\,\text{Ci} \times 3.7\times10^{10}\,\frac{\text{decays}}{\text{Ci}\cdot\text{s}} \times 0.1 \times 1.5\times10^{6}\,\text{eV} \times 1.6\times10^{-19}\,\frac{\text{J}}{\text{eV}}$

$$\times\, 0.5 \times 12 \times 365 \times 60 \times 60\ \text{s} \times \frac{1}{50\,\text{kg}} \times 1$$

0.5 liters a day — the milk stays in the stomach 12 hrs a day — QF

$$= 2.8\times10^{-7}\ \text{Sv} = 2.8\times10^{-5}\ \text{rem}$$

For a 5kg baby: 2.8×10^{-4} rem

43-52 $^{222}_{86}Rn$ α- emission

$$^{A}_{Z}X \rightarrow {}^{A-4}_{Z-2}X + {}^{4}_{2}He$$

a) Daughter nucleus: $^{218}_{84}Po$

b) It is radioactive it decays to $^{214}_{82}Pb$ (α-decay) or $^{218}_{85}At$ (β^- decay) with a lifetime of 3.1 minutes (See Giancoli, page 1077)

c) It is reactive

d) 1 ng

magnitude

$$\left(\frac{dN}{dt}\right)_0 = \lambda N_0 = \frac{0.693}{T_{1/2}} \frac{10^{-9}\,\text{gr}}{222\,\text{gr}}\, 6.02\times10^{23} = 5.69\times10^{6}\,\text{s}^{-1}$$

$T_{1/2} = 3.8235 \times 24 \times 3600\,\text{s}$

after 1 month $\left(\frac{dN}{dt}\right) = \left(\frac{dN}{dt}\right)_0 e^{-\lambda t} = 5.69\times10^{6}\, e^{-\frac{0.693}{3.8235\times24\times3600\,\text{s}} \times 30\times24\times3600\,\text{s}}$

$$= 2.47\times10^{4}\,\text{s}^{-1}$$