HW#23

Soil to plant transfer rates for Cs^{137}
- tropical fruits on Bikini atoll is e/w 2-40
- continental soils ranges e/w 0.005-0.5

1) Calculate specific activity of Cs^{137} in Bq/g if weight % of isotope in soil is 0.01%.

$$A' = \lambda N = \lambda \frac{\gamma A_N}{M} = \frac{\left(7.28e{-}10\ \frac{1}{s}\right)\left(\frac{0.01}{100}\right)(6.022e23)}{(136.907)} = \boxed{3.202e{-}7\ \frac{Bq}{g}}$$

$$\lambda = \frac{\ln(2)}{T_{1/2}} = \frac{\ln(2)}{30\ \text{years}\ 70\ \text{days}} = \frac{\ln(2)}{(9.461e8\ s + 6.048e6\ s)} = 7.28e{-}10\ \frac{1}{s}$$

2) Calc ranges of specific activities of Cs^{137} to plants grown in each soil

$A' = \frac{\lambda A_N}{M}\ \gamma$ & τ changes, but all else stays same

Bikini Atoll: for 2-40, A' ranges from $6.404e10\ \frac{Bq}{g} - 1.281e12\ \frac{Bq}{g}$

continental soil: for 0.005-0.5, A' ranges from $1.601e8\ \frac{Bq}{g} - 1.601e10\ \frac{Bq}{g}$