(5.3) The CO_2 in the atmosphere is in exchange with carbon in living organisms, humus, dissolved organic compounds, and carbonate in the sea water, the latter being the main reservoir (88%) of all exchangeable carbon. The amount of such exchangeable carbon is estimated to be 7.9 g cm^{-2} of the earth. When cosmic-ray produced ^{14}C is mixed into this exchangeable carbon, what will the specific activity become?

First we define the Bq, the minimum production rate (Table 5.1.a) and the specific amount of carbon:

$Bq := sec^{-1}$ $\quad$ $Prodrate_{min} := 17000 \cdot m^{-2} \cdot sec^{-1}$ $\quad$ $AmountC := 7.9 \cdot gm \cdot cm^{-2}$

At equilibrium: Production rate = Decay rate. For the maximum production rate:

$$A_{averagemin} := \frac{Prodrate_{min}}{AmountC} \qquad A_{averagemin} = 215.19 \cdot \frac{Bq}{kg}$$

Repeat this calculation also for the maximum production rate (Table 5.1.a)

$$Prodrate_{max} := 25000 \cdot m^{-2} \cdot sec^{-1}$$

$$A_{averagemax} := \frac{Prodrate_{max}}{AmountC} \qquad A_{averagemax} = 316.456 \cdot \frac{Bq}{kg}$$

Then compute the mean between max and min specific activities:

$$A_{averagemean} := \frac{A_{averagemin} + A_{averagemax}}{2} \qquad A_{averagemean} = 266 \cdot \frac{Bq}{kg}$$