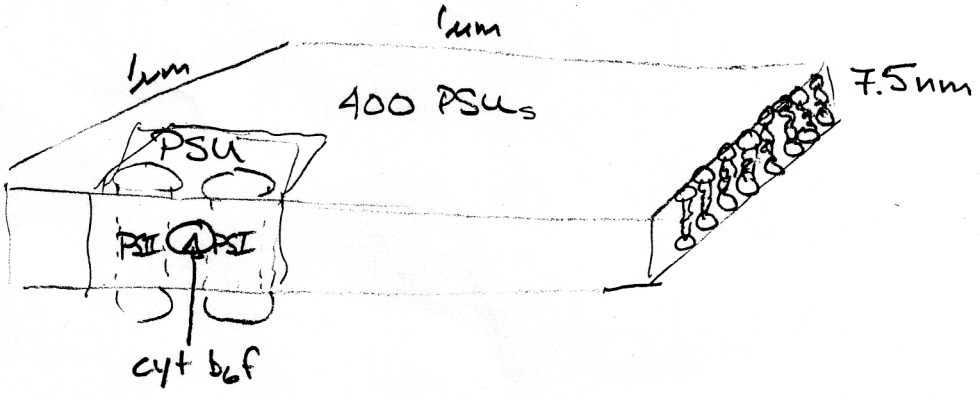
1/10/88

Components in a Thylakoid Membrane



400 PSU/μm² 600 Chlorophylls/PSU

PSII	400 kdal
cyt b_6f complex	100 kdal
PSI	500 kdal

How much carbon is needed for these components?

Membrane

$7.5 \times 10^{-3}\ \mu m \times .86 \times 10^{-12}\ \frac{g}{\mu m^3} \times 94\% = 6 \times 10^{-15}\ g/\mu m^2$

thickness; density; Lipids are 94% C by weight

PROTEIN

$400\ \frac{PSU}{\mu m^2} \times 10^6\ \frac{daltons}{PSU} \times \frac{1}{6 \times 10^{23}}\ \frac{g}{dalton} \times 72\% = 4.7 \times 10^{-15}\ g/\mu m^2$

protein is 72% C by weight

Chlorophyll

$400\ \frac{PSU}{\mu m^2} \times 600\ \frac{chla\ molecules}{PSU} \times 894\ \frac{g}{mol} \times \frac{1}{6 \times 10^{23}}\ \frac{mole}{molecule} \times 74\% = 2.3 \times 10^{-15}\ g/\mu m^2$

chlorophyll is 74% C by weight

TOTAL

$13 \times 10^{-15}\ gC/\mu m^2$

$$\frac{\text{TOTAL C}}{\text{Chlorophyll}} = \frac{13}{2.3} = 5.6$$