

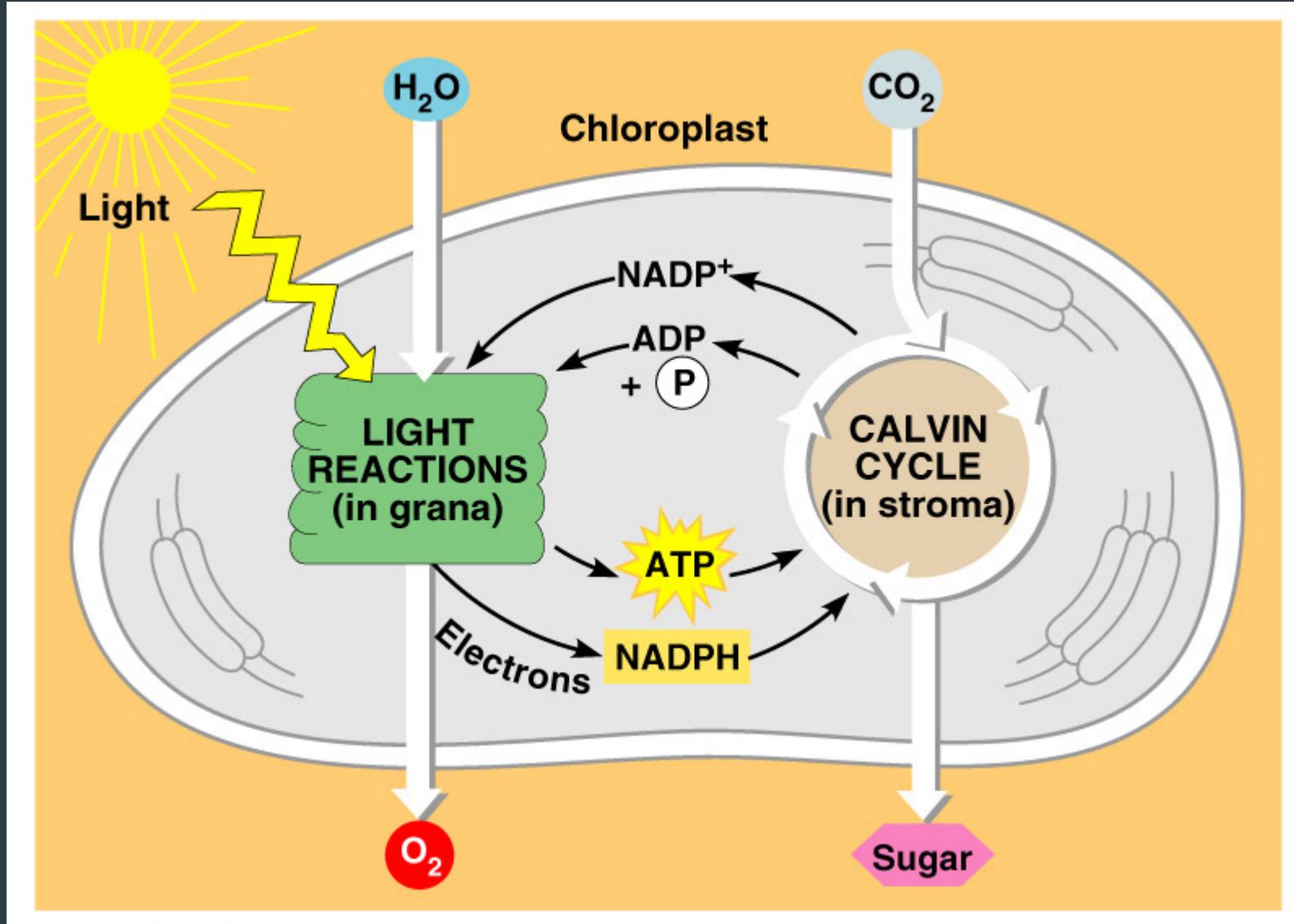
Metabolismo Energético

Espectro de Ação da Fotossíntese

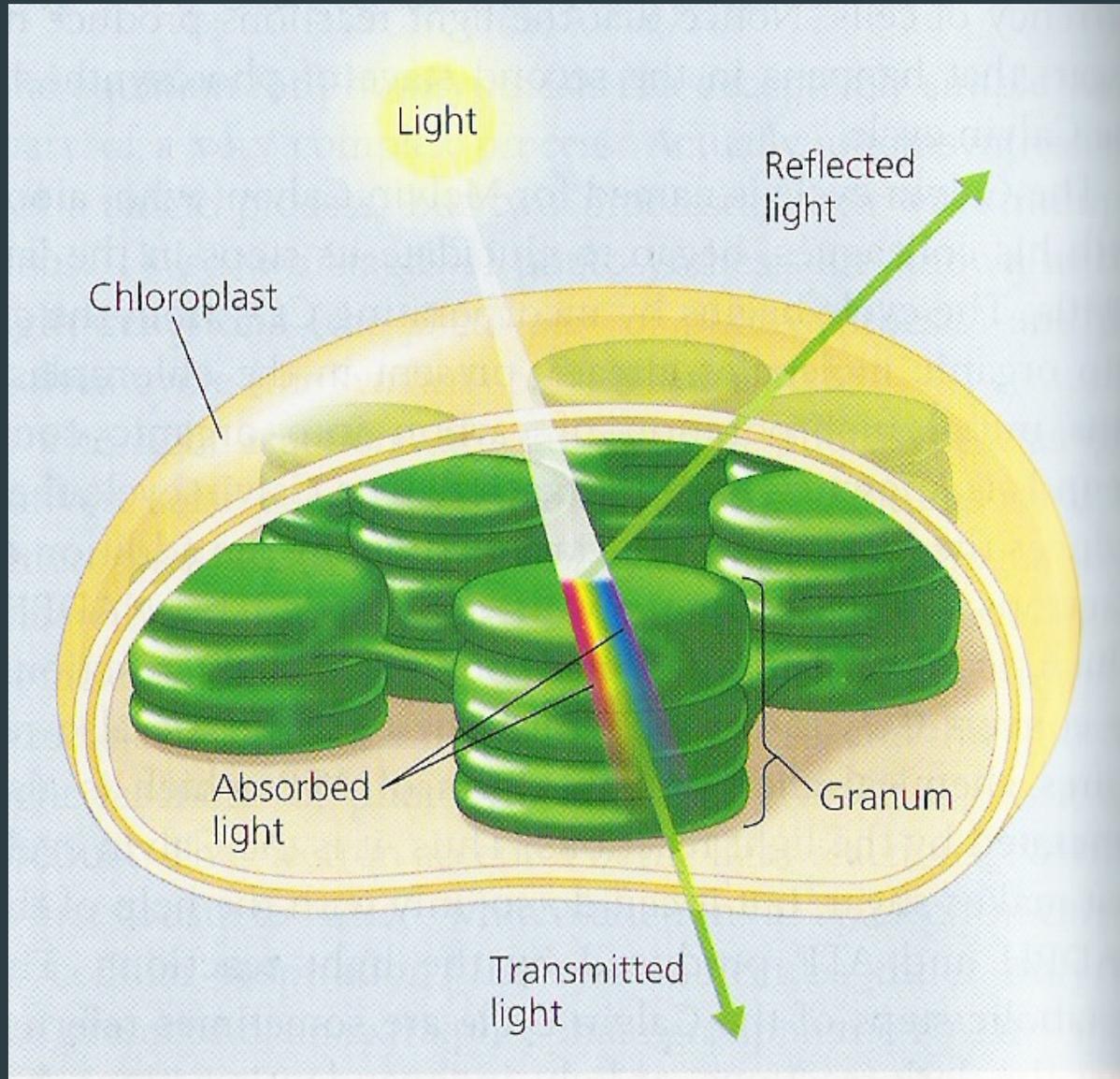
Bernardo Duarte (baduarte@fc.ul.pt)

DBV / MARE / BIOTOX lab

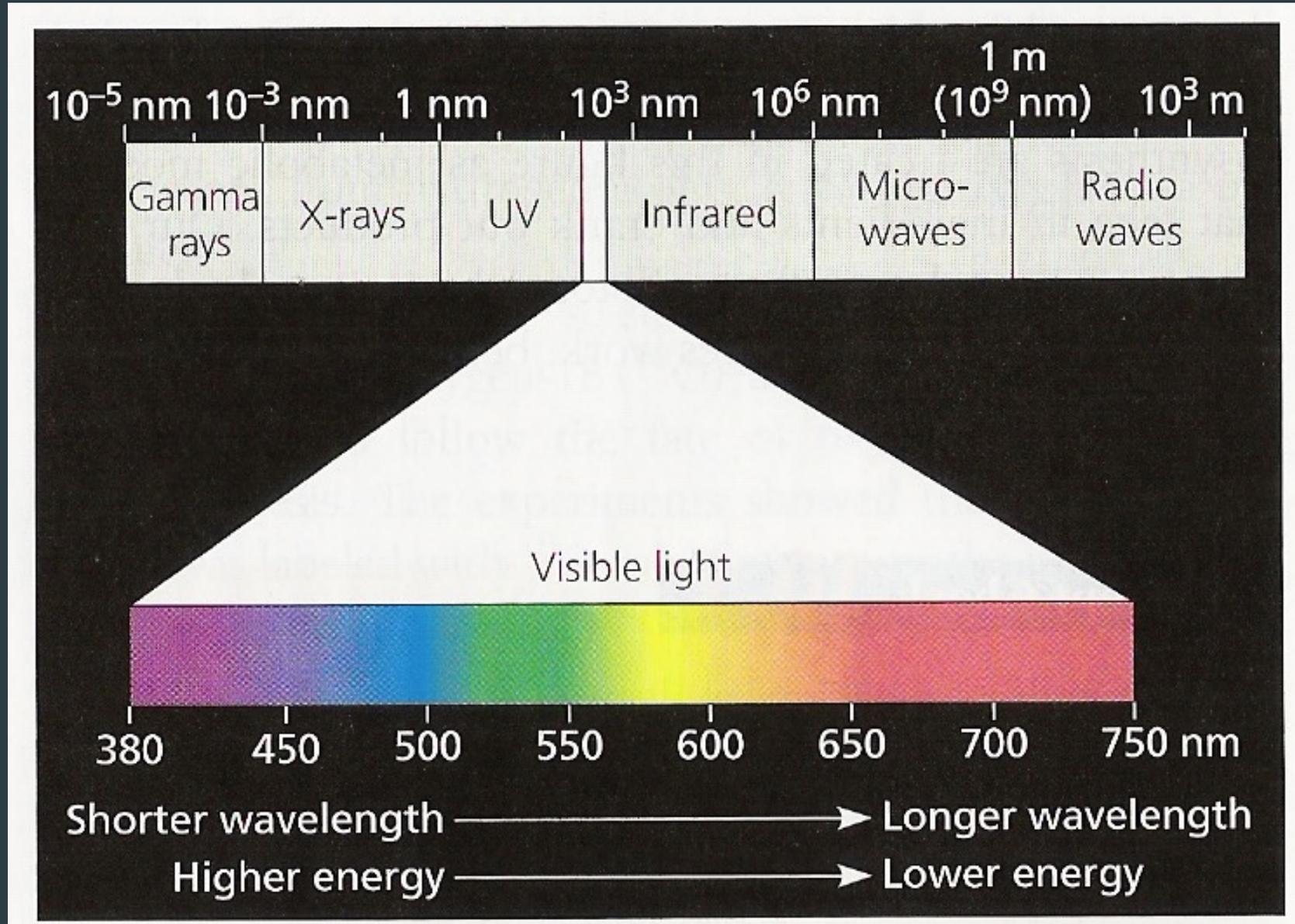
Dois conjuntos de reações da fotossíntese



Captura do espectro solar



Espectro Visível



Espectro de Absorção

Pigmentos são moléculas coloridas com capacidade de absorção de energia luminosa.

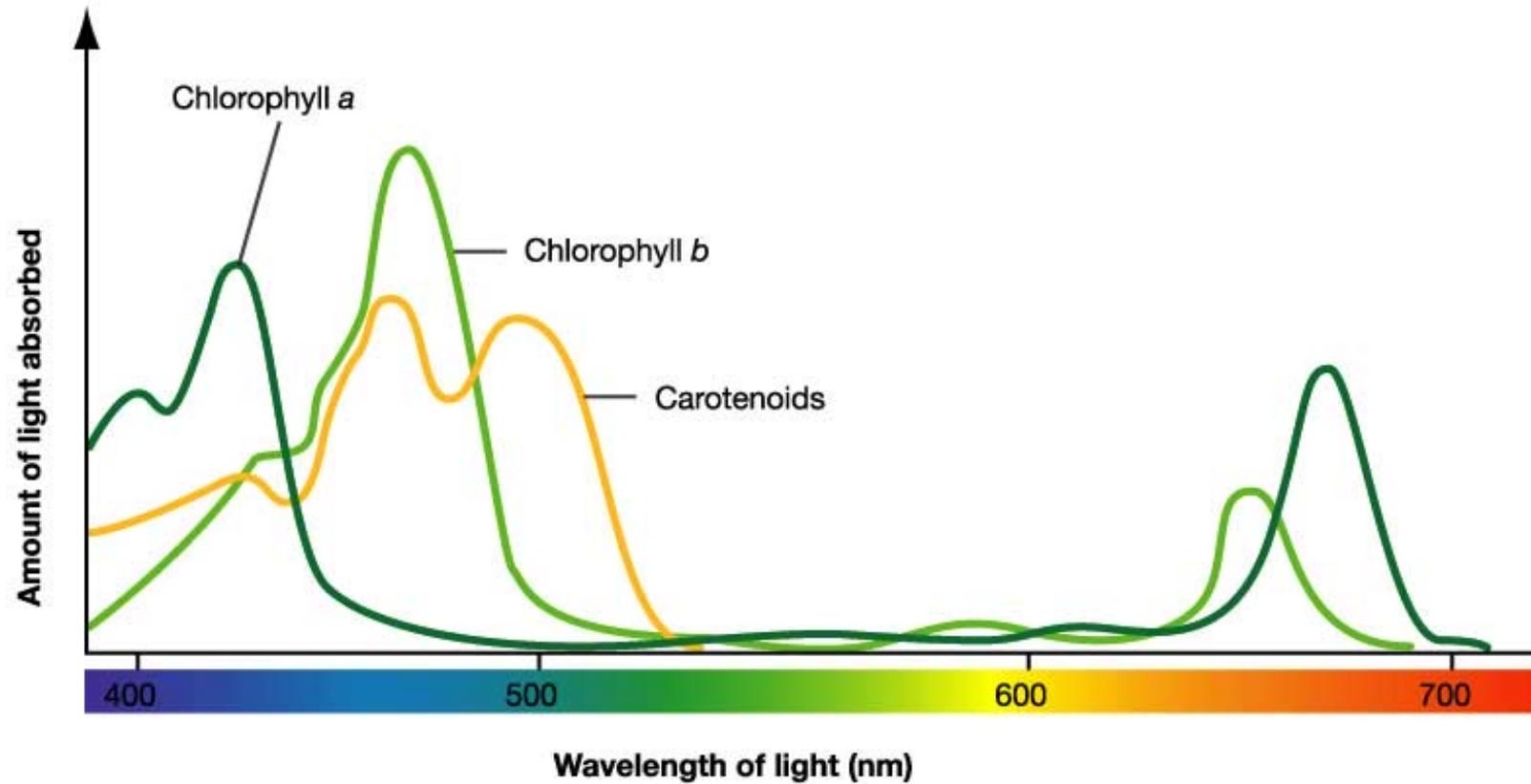
Pigmentos diferentes absorvem comprimentos de onda diferentes, sendo que as clorofila a é o pigmento principal com capacidade de utilizar directamente a energia luminosa.

Pigmentos acessórios permitem à planta maximizar as reações fotossintéticas, permitindo uma maior absorção de energia luminosa ou dissipando energia excessiva.

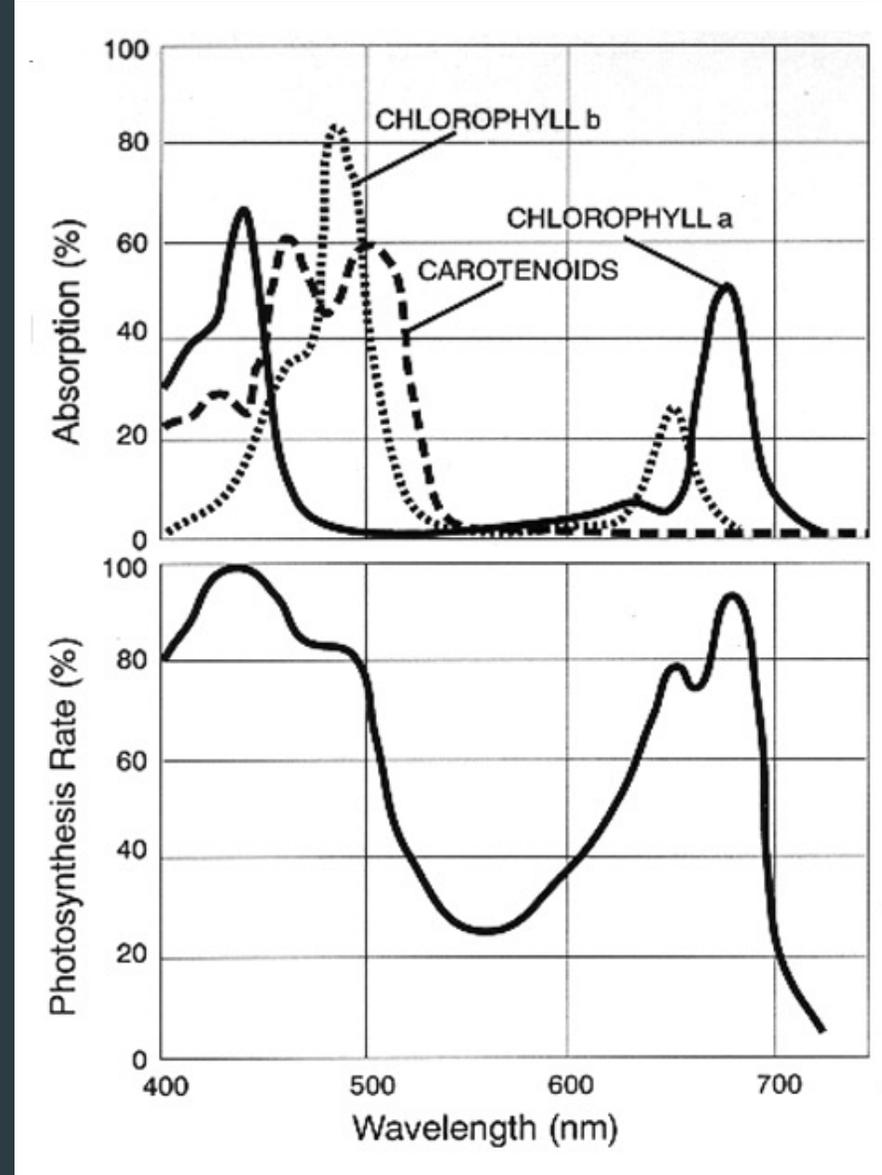
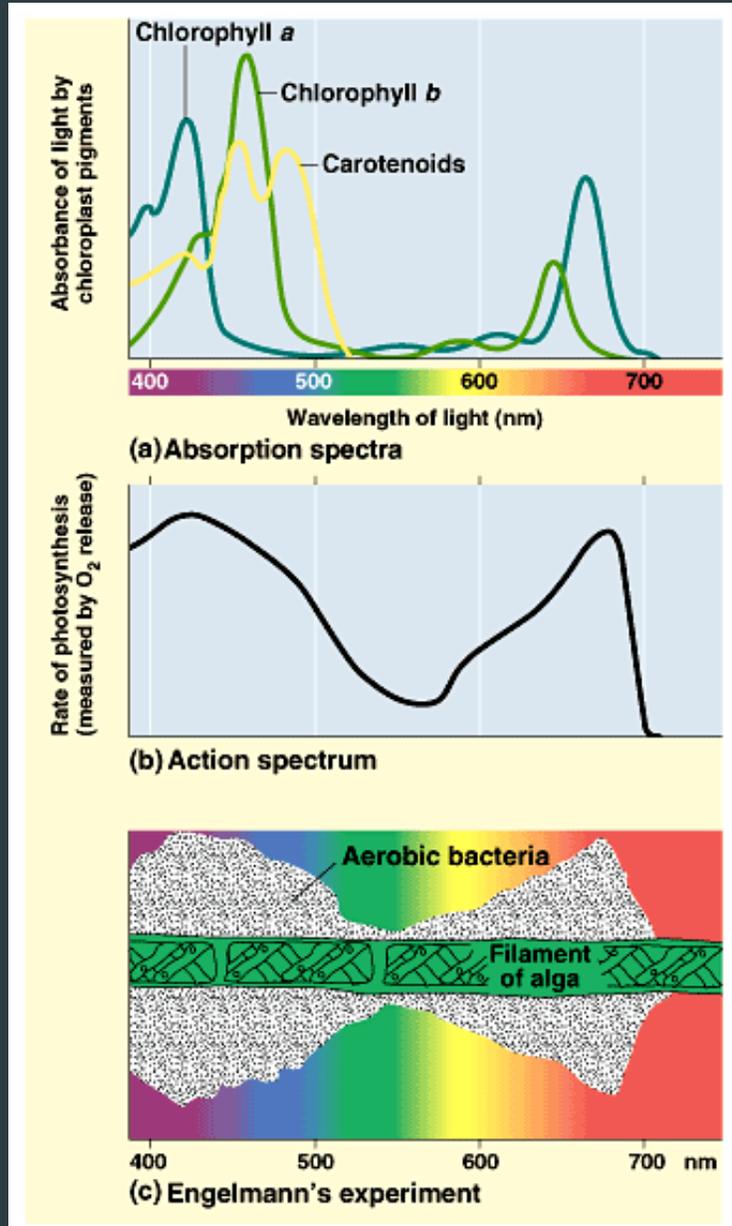
Carotenoides e Xantófilas

Antocianinas

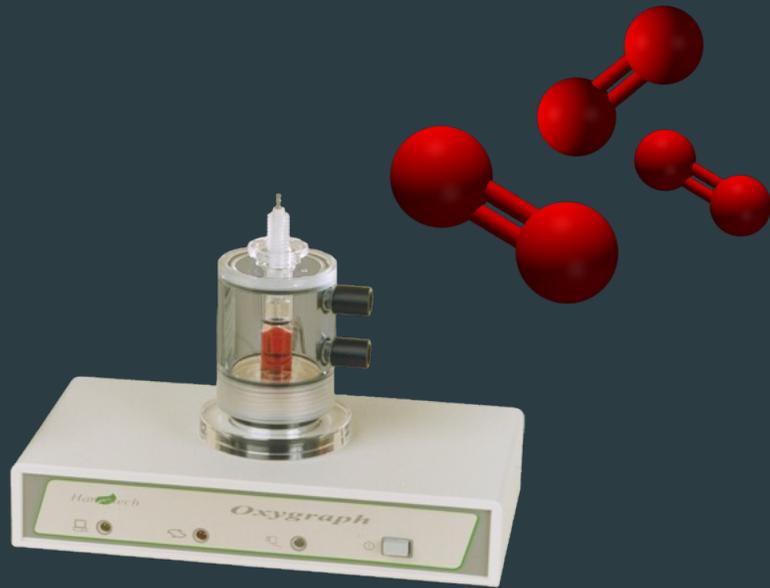
Espectro de Absorção



Espectro de Ação



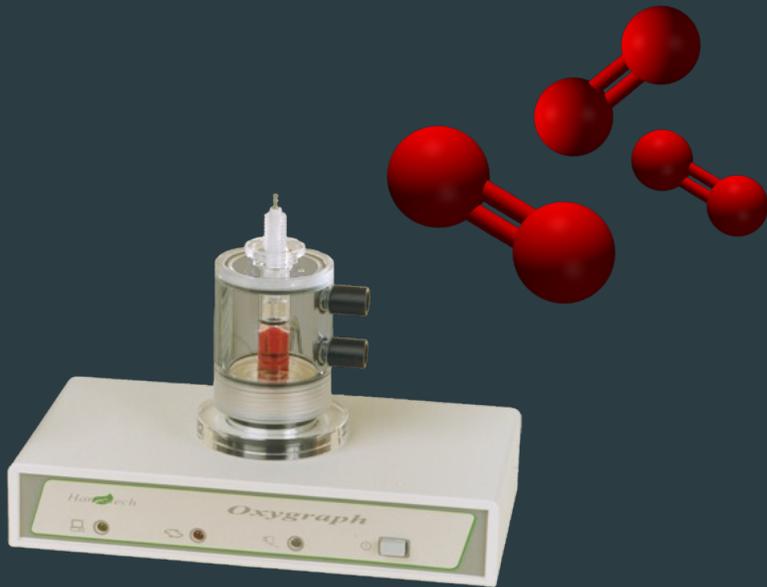
Rendimento Quântico



Rendimento Quântico Aparente = μmol Oxigénio produzido / μm fótons incidentes

Porque designamos este rendimento como aparente?

Rendimento Quântico

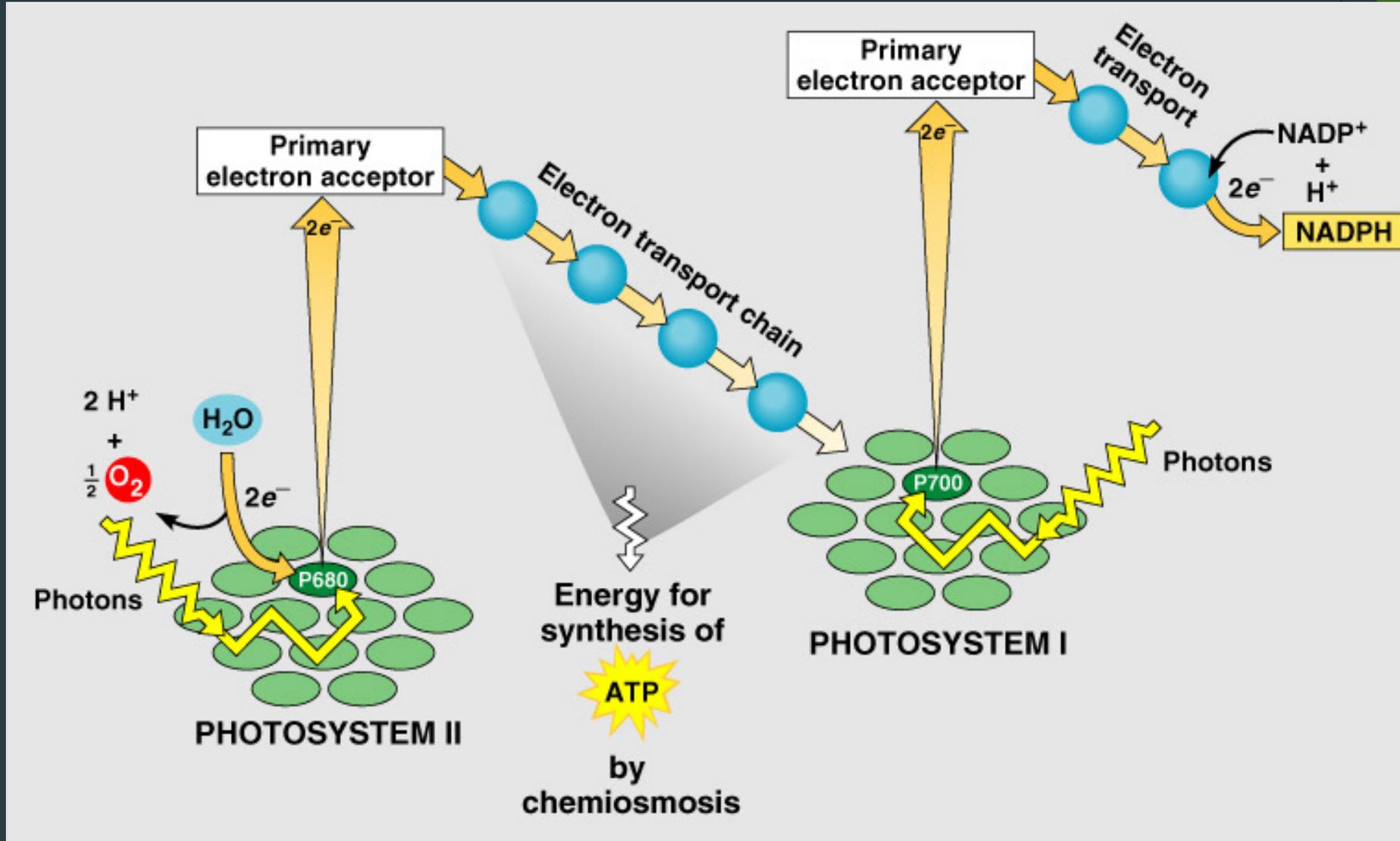


Qual o organismo com maior rendimento quântico aparente: Organismo A capaz de produzir 500 $\mu\text{mol O}_2$ quando exposto a 125 μmol fótons vermelhos ou Organismo B capaz de produzir 280 $\mu\text{mol O}_2$ quando exposto a 70 μmol fótons azuis?

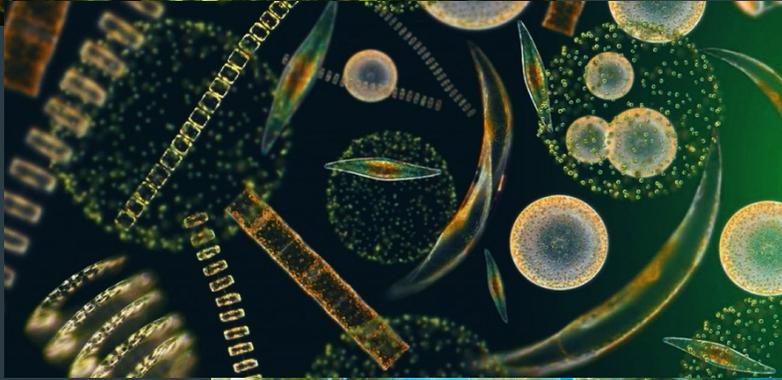


Fotossistemas e Cadeia Transportadora de Electrões

Cadeia Transportadora de Electrões (*Electrtron Trasnpot Chain, ETC*):



No Oceano...



OCEANS FACTS

It's #WorldOceansDay!

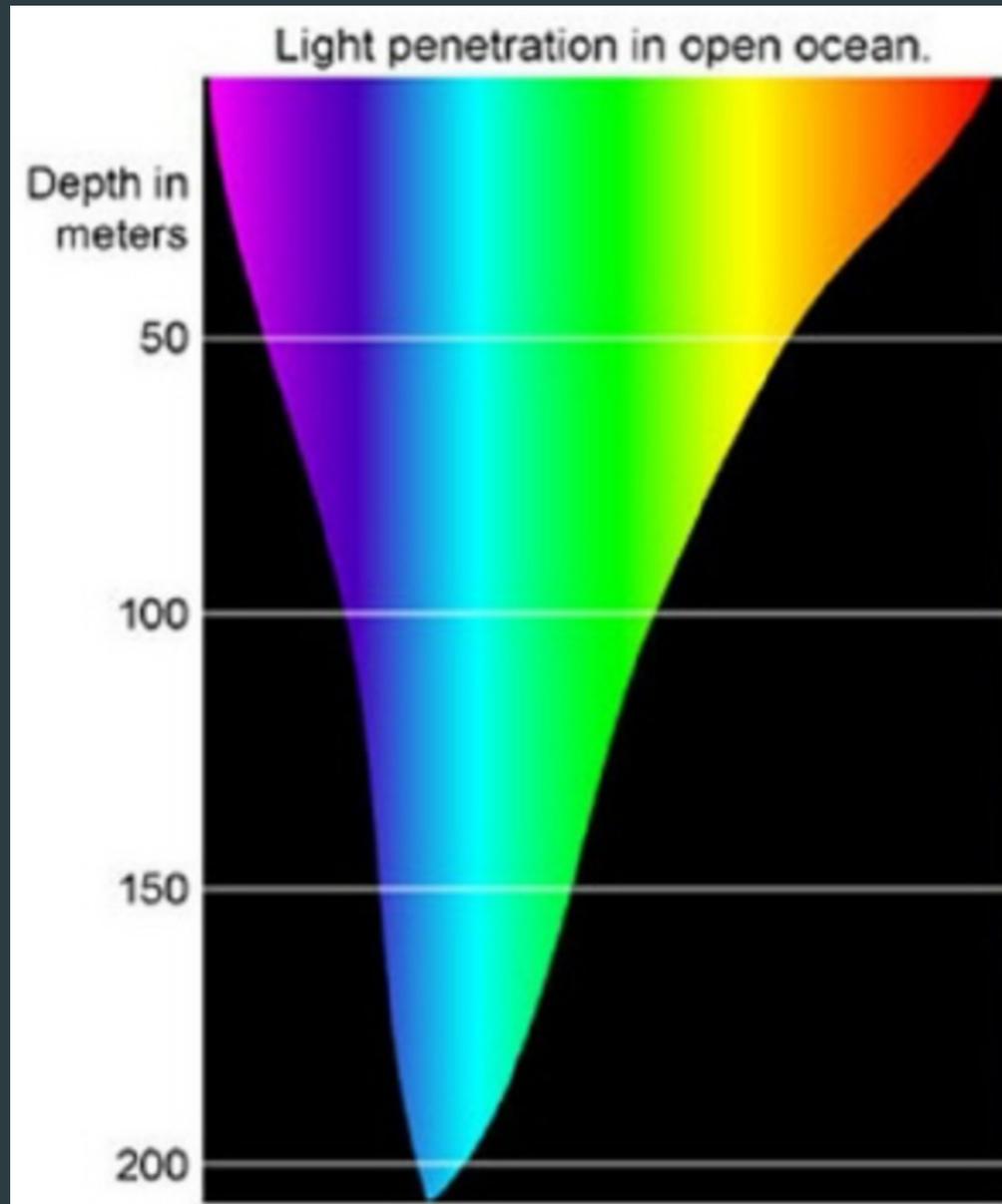
Every second breath you
take comes from the ocean.

14 LIFE BELOW
WATER



#OCEANCONFERENCE

No Oceano...

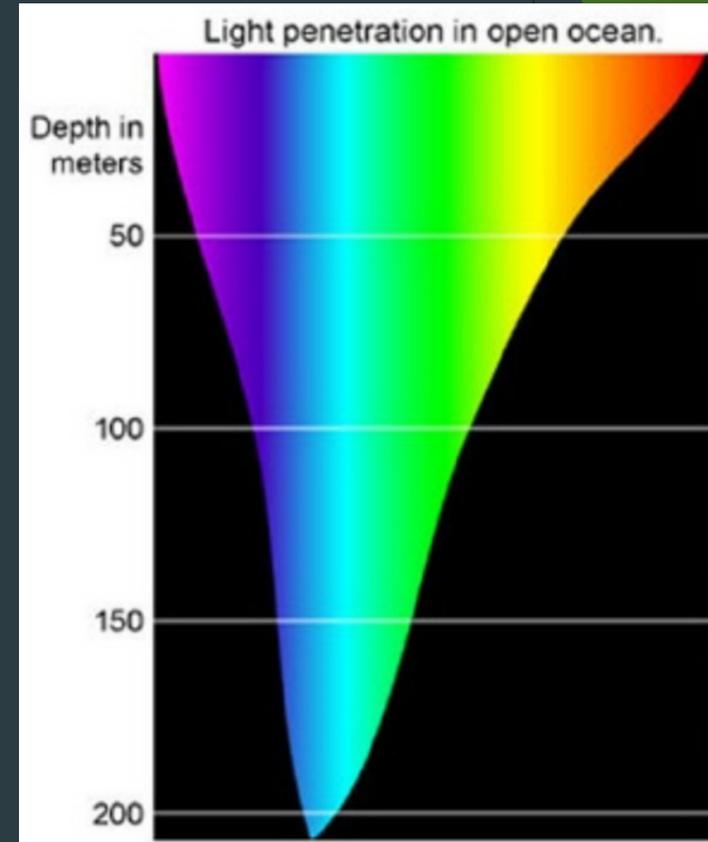
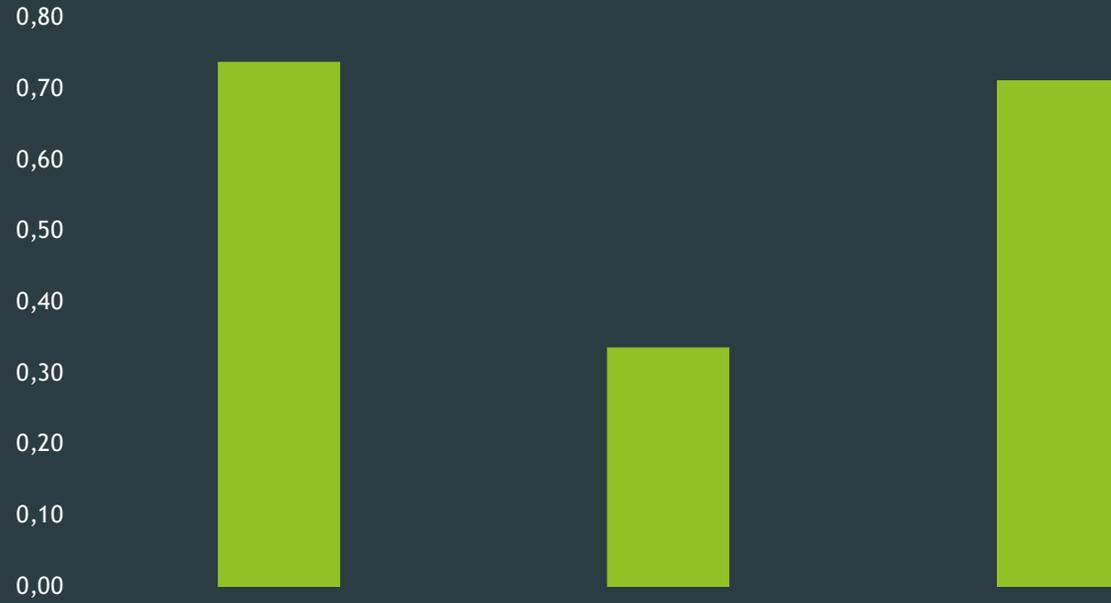


Os comprimentos de onda mais altos (menos energéticos) extinguem-se nos primeiros metros da coluna de água

A maior profundidade os organismos fotossintéticos apenas recebem apenas luz de comprimentos de onda mais baixos (mais energéticos).

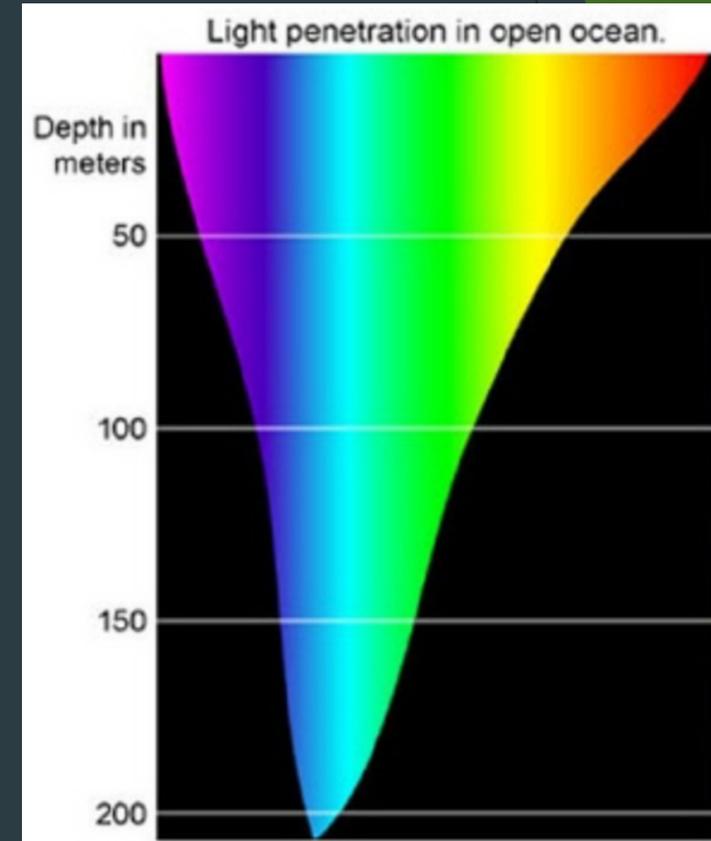
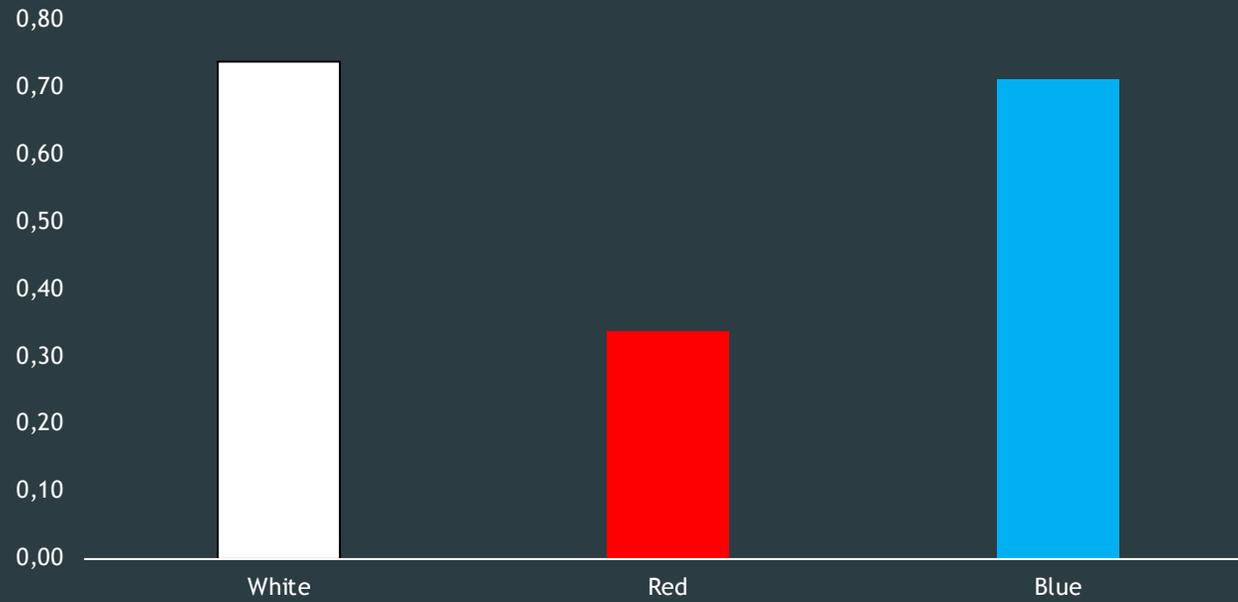
No Oceano...

Taxa de crescimento (células mL⁻¹ dia⁻¹)

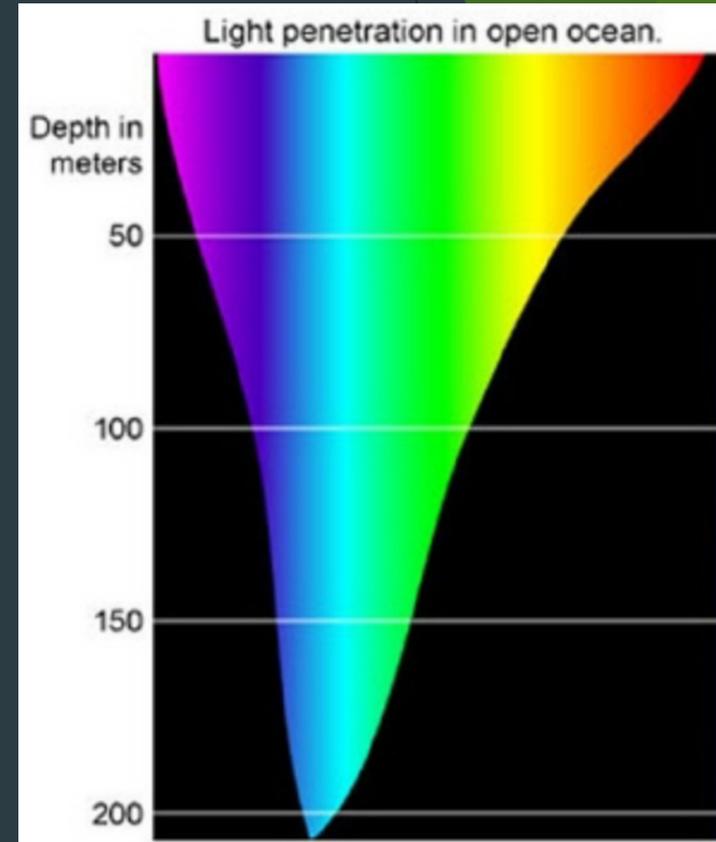
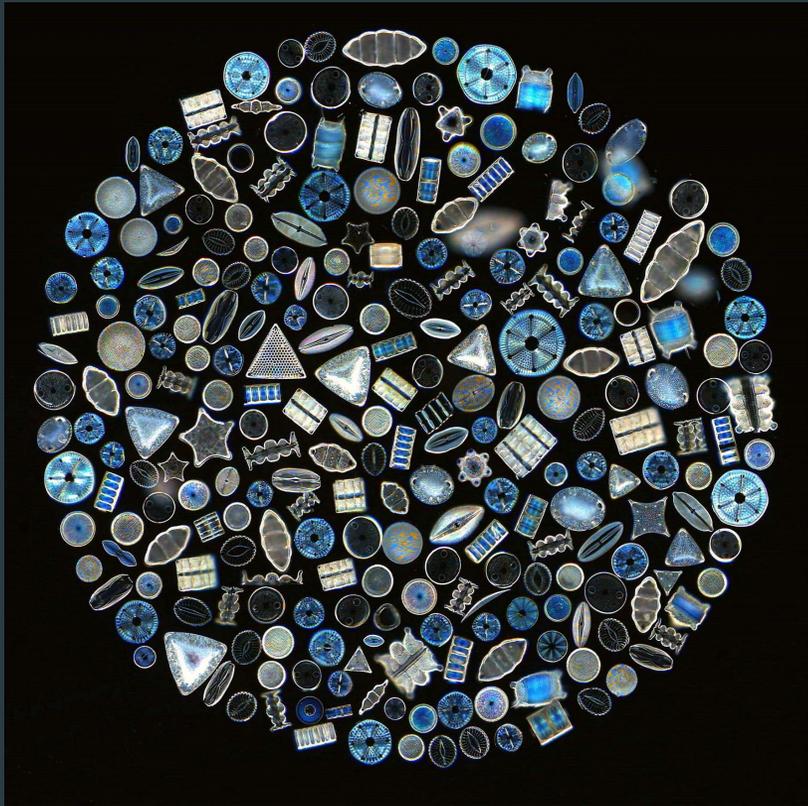


No Oceano...

Taxa de crescimento (células mL⁻¹ dia⁻¹)

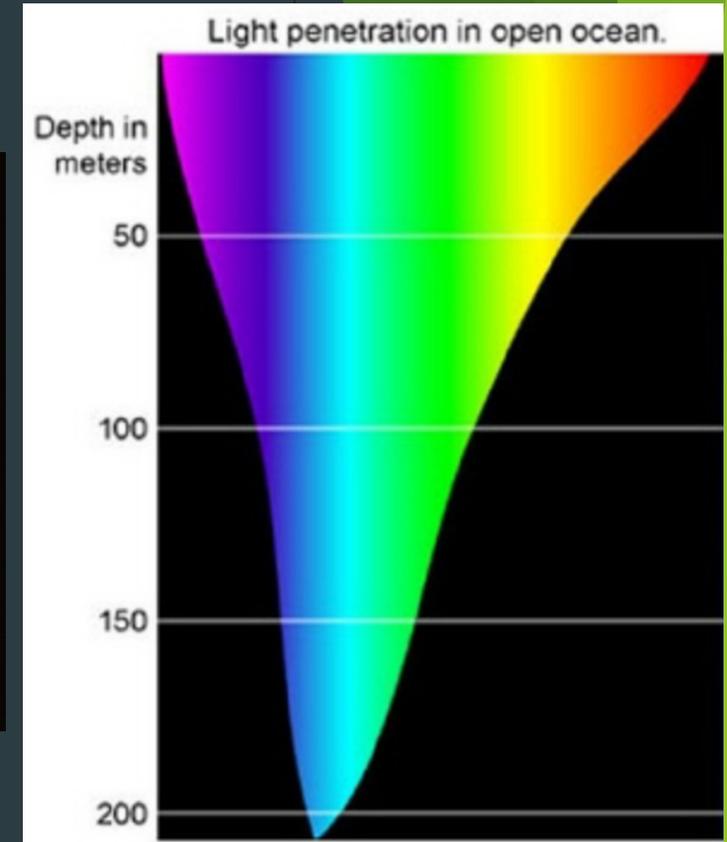
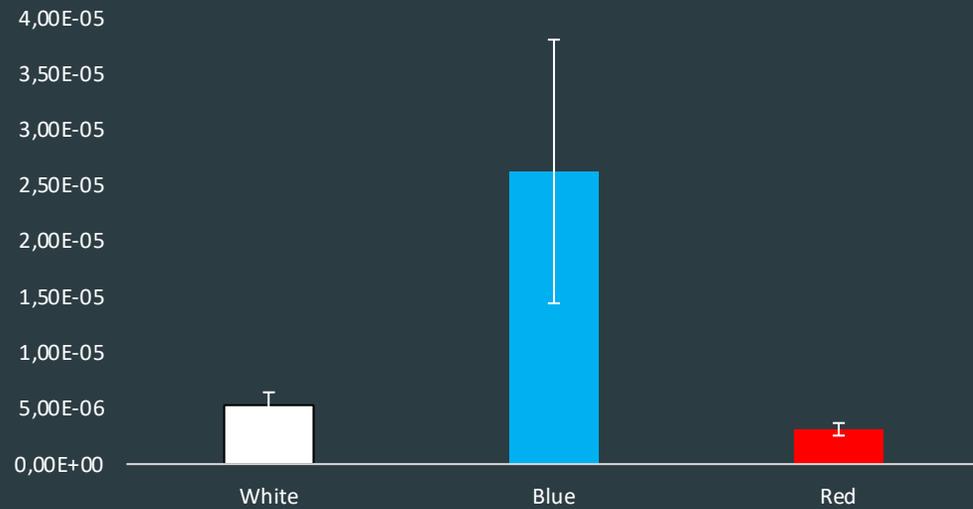


No Oceano...

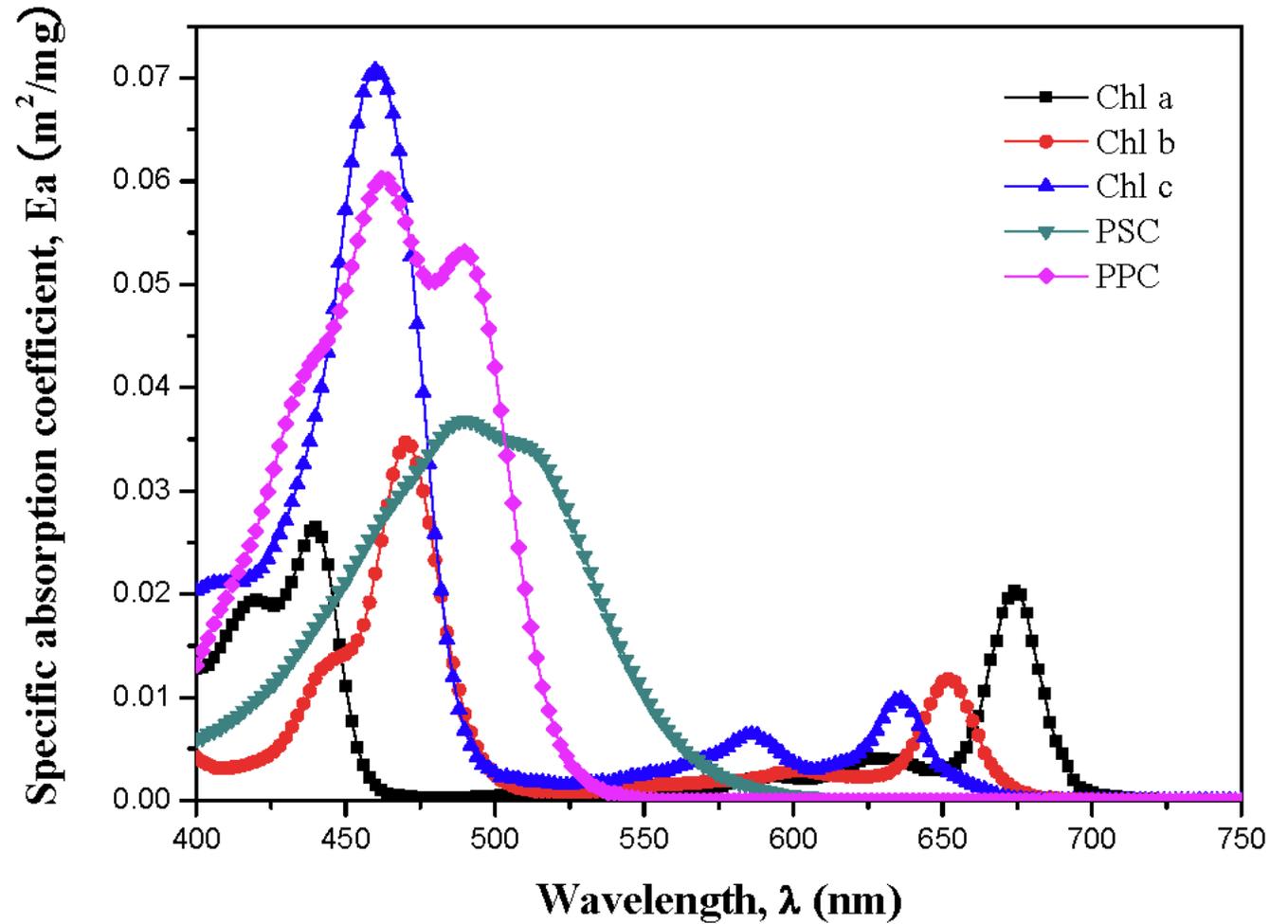


No Oceano...

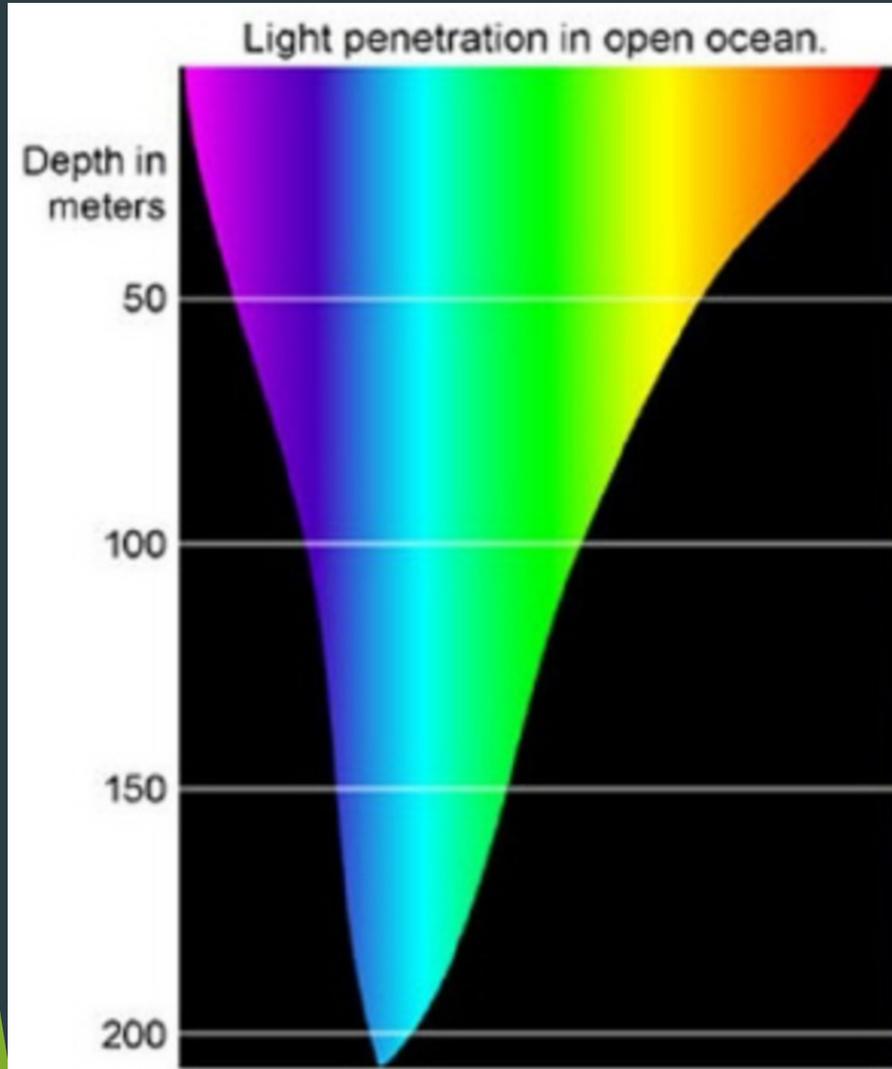
Ácidos gordos totais ($\mu\text{g cell}^{-1}$)



Pigmentos fotorreceptores em diatomáceas

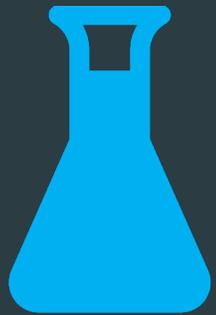
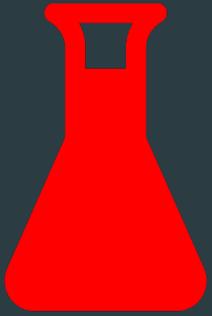


Aula Prática



Culturas de diatomáceas marinhas

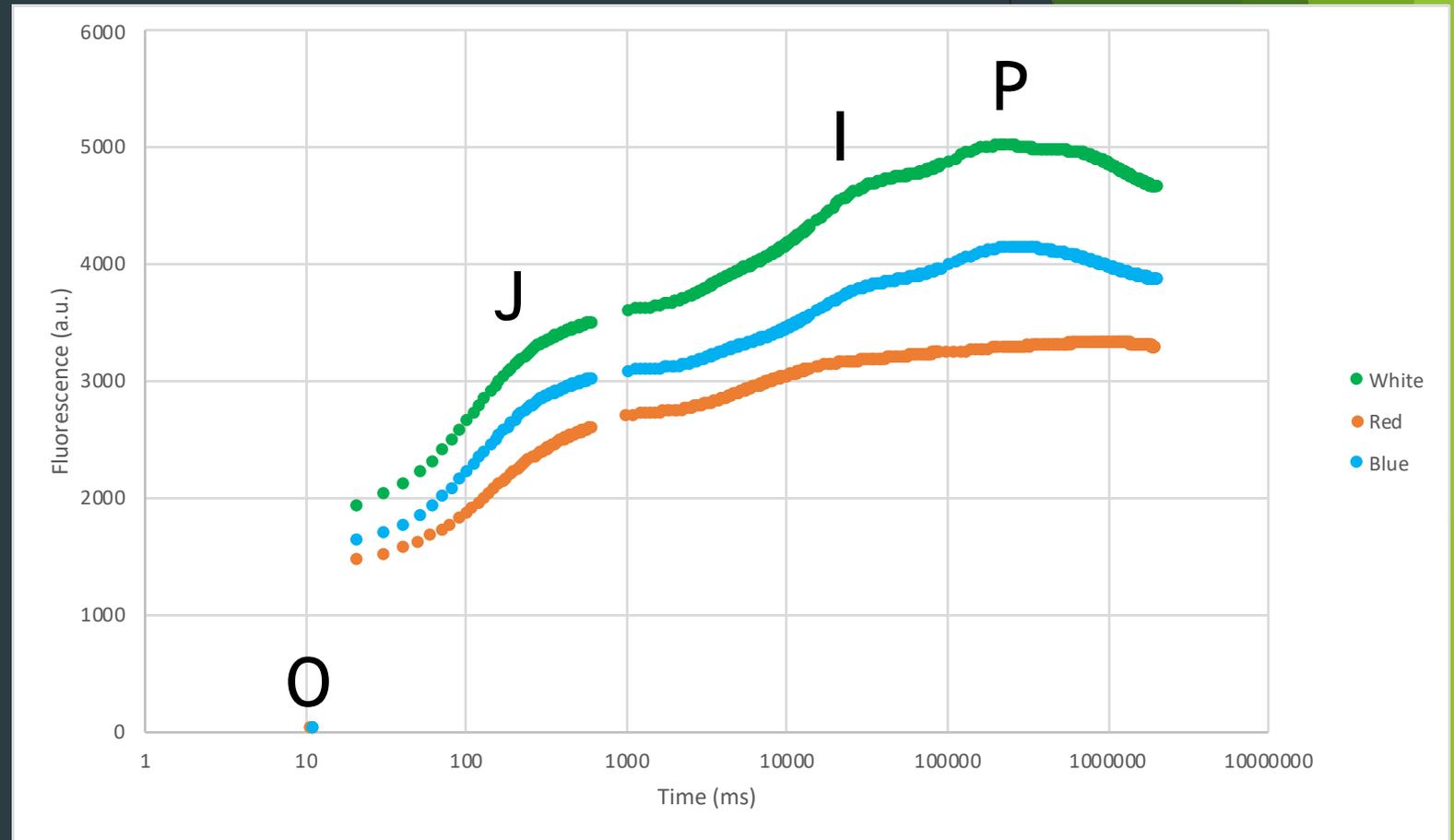
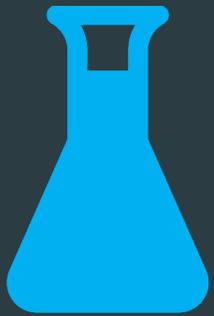
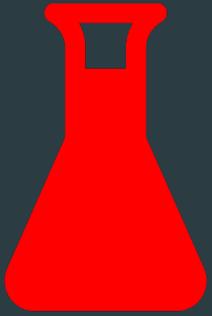
- Luz total
- Apenas luz vermelha
- Apenas luz azul



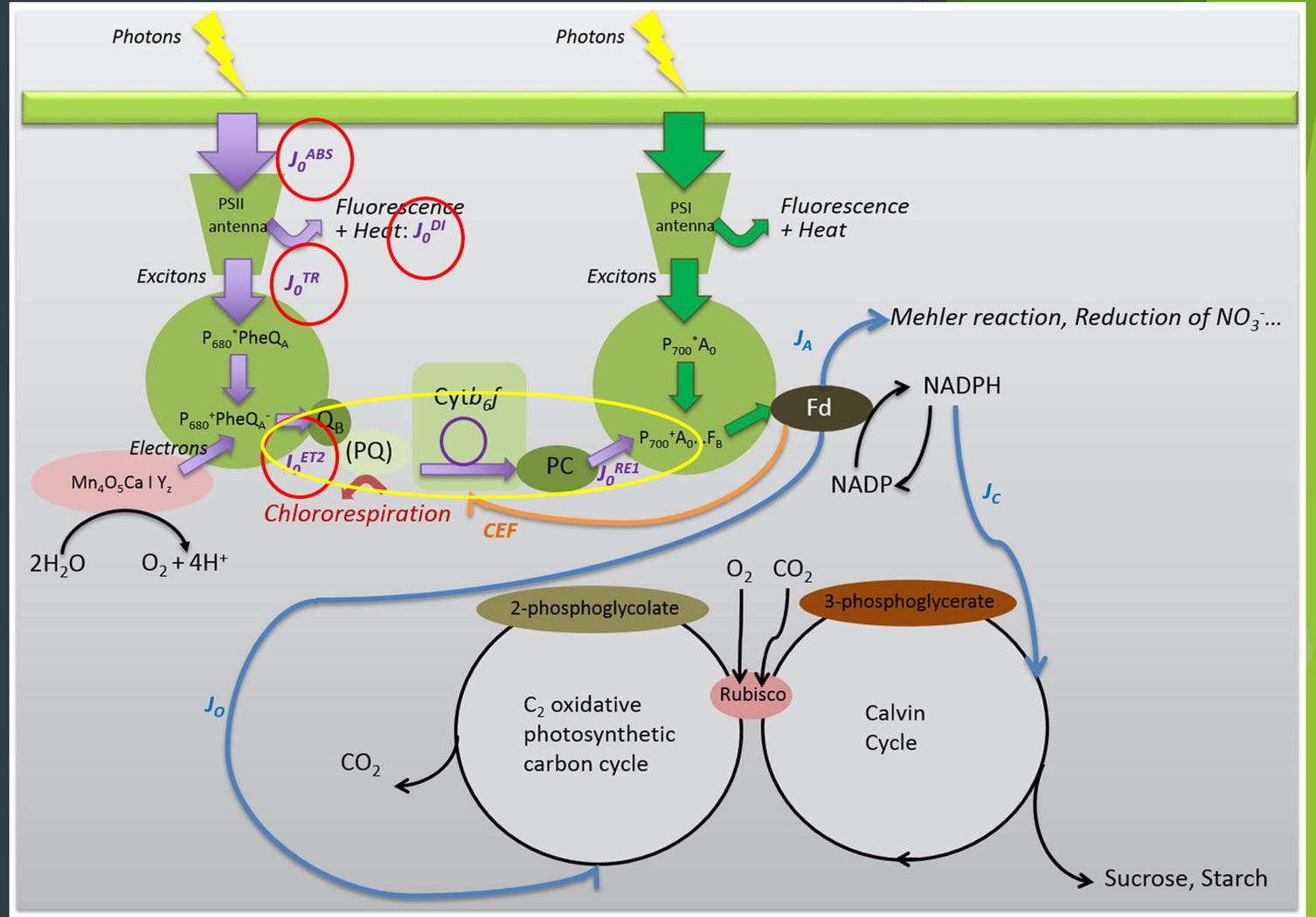
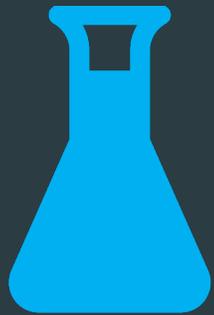
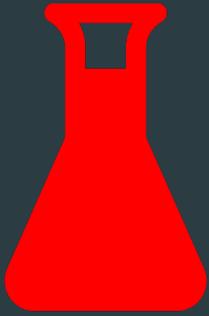
Rendimento Quântico do PS II (F_v/F_m)

Fluxos Energéticos

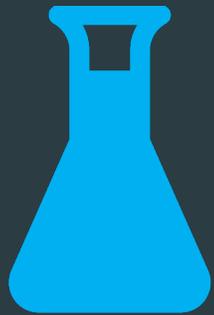
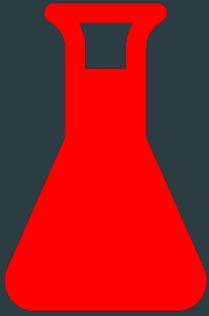
Aula Prática



Aula Prática



Aula Prática



Fluxos Energéticos

ABS/RC - Fluxo de energia absorvido

TR/RC - Fluxo de energia aprisionado

ET/RC - Fluxo de energia transportado

DI/RC - Fluxo de energia dissipado

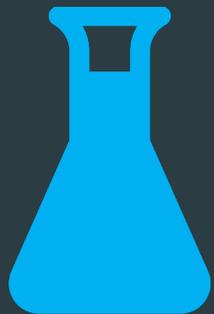
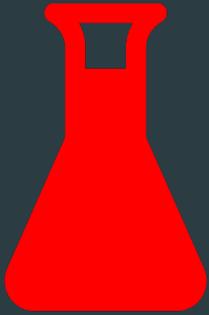
$$ABS/RC = TR/RC + DI/RC$$

$$\%TR = \frac{TR/RC}{ABS/RC} \times 100$$

$$\%DI = \frac{DI/RC}{ABS/RC} \times 100$$

$$\%ET = \frac{ET/RC}{TR/RC} \times 100$$

Aula Prática



	Branco	Azul	Vermelho
ABS/RC	7,83	5,55	6,12
TRo/RC	3,22	2,86	2,96
ETo/RC	0,80	1,14	1,20
Dlo/RC	4,61	2,69	3,16

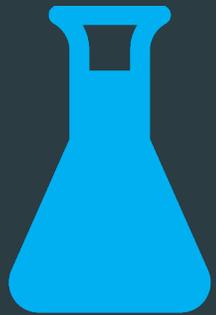
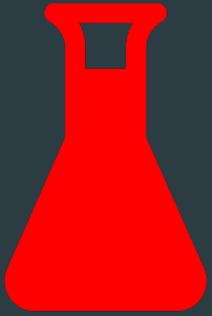
$$ABS/RC = TR/RC + DI/RC$$

$$\%TR = \frac{TR/RC}{ABS/RC} \times 100$$

$$\%DI = \frac{DI/RC}{ABS/RC} \times 100$$

$$\%ET = \frac{ET/RC}{TR/RC} \times 100$$

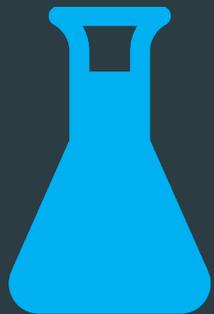
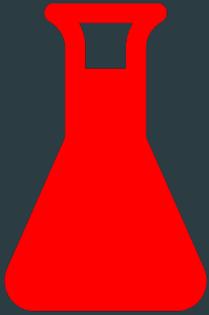
Aula Prática



	Branco	Azul	Vermelho
ABS/RC	7,83	5,55	6,12
TRo/RC	3,22	2,86	2,96
ETo/RC	0,80	1,14	1,20
Dlo/RC	4,61	2,69	3,16

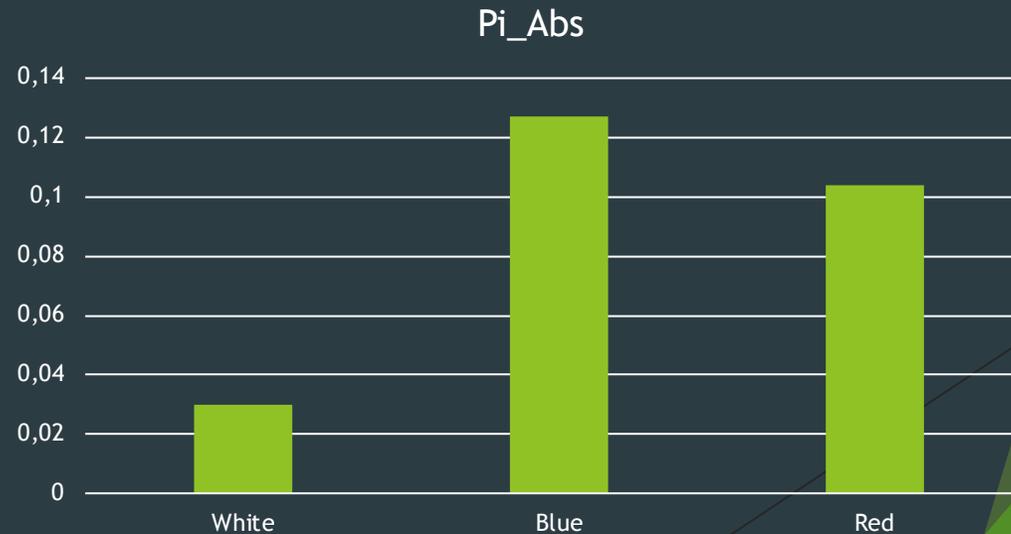
ABS/RC	7,83	5,55	6,12
%TR	41%	52%	48%
%ET	25%	40%	41%
%DI	59%	48%	52%

Aula Prática

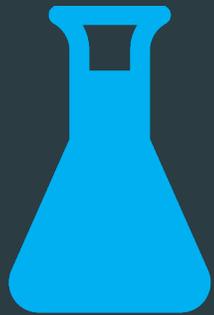
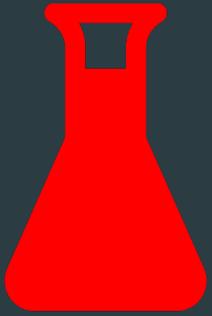


	Branco	Azul	Vermelho
ABS/RC	7,83	5,55	6,12
TRo/RC	3,22	2,86	2,96
ETo/RC	0,80	1,14	1,20
DIo/RC	4,61	2,69	3,16

ABS/RC	7,83	5,55	6,12
%TR	41%	52%	48%
%ET	25%	40%	41%
%DI	59%	48%	52%



Aula Prática



Porque é que as culturas expostas a luz branca tem um PI tão baixo comparativamente com as iluminadas apenas com azul e/ou vermelho sendo que o branco contem luz azul e branca?

