

Is photophosphorylation different from photorespiration?

Good question. There are two ‘photo’ terms that are easy to mix up:

1) Photophosphorylation – the process of using light to drive ATP synthesis.

Photophosphorylation can be cyclic or non-cyclic. The cyclic process generates only ATP, while the non-cyclic generates ATP and NADPH.

2) Photorespiration – occurs when RUBISCO adds O₂ to ribulose-1,5-bisphosphate instead of CO₂.

I'm a little bit unclear about what the calvin cycle is? Is it the regeneration of ribulose-1,5-bisphosphate?

It IS the regeneration of ribulose-1,5-bisphosphate, but it also generates one three carbon molecule that can be used for gluconeogenesis:

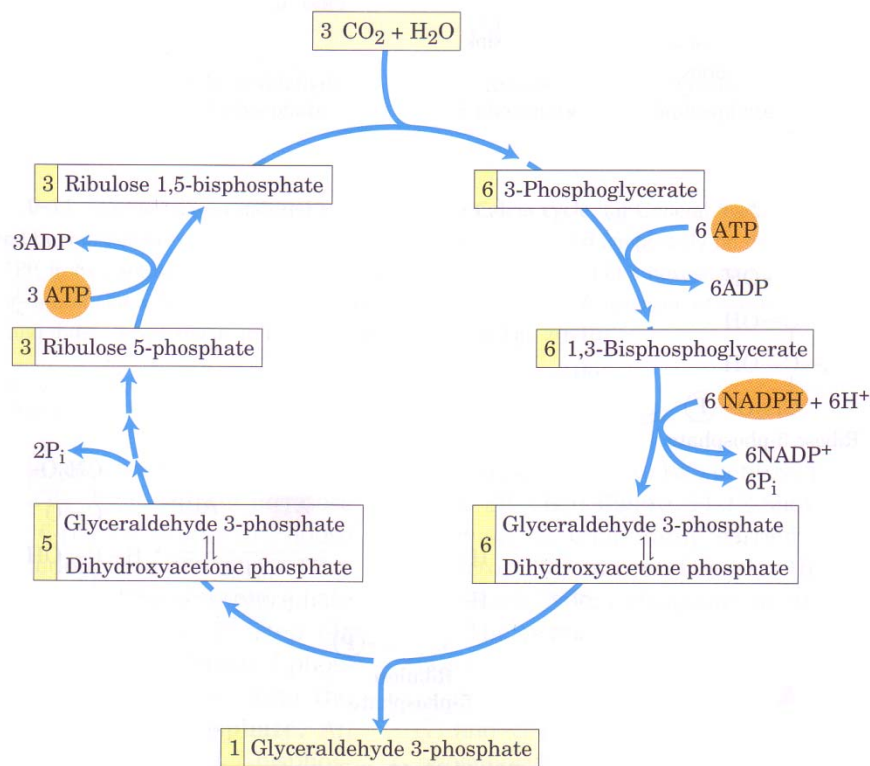


FIGURE 20-14 Stoichiometry of CO₂ assimilation in the Calvin cycle. For every three CO₂ molecules fixed, one molecule of triose phosphate (glyceraldehyde 3-phosphate) is produced and nine ATP and six NADPH are consumed.

As you can see, the product of 3 CO₂ assimilations (on the top) is one glyceraldehyde-3-phosphate (on the bottom) which can be used in gluconeogenesis.

In Chloroplasts, protons are pumped from stroma into the lumen....but didn't the mitochondria pump protons from the matrix to the inner-membrane space?

Yes. See the figure below:

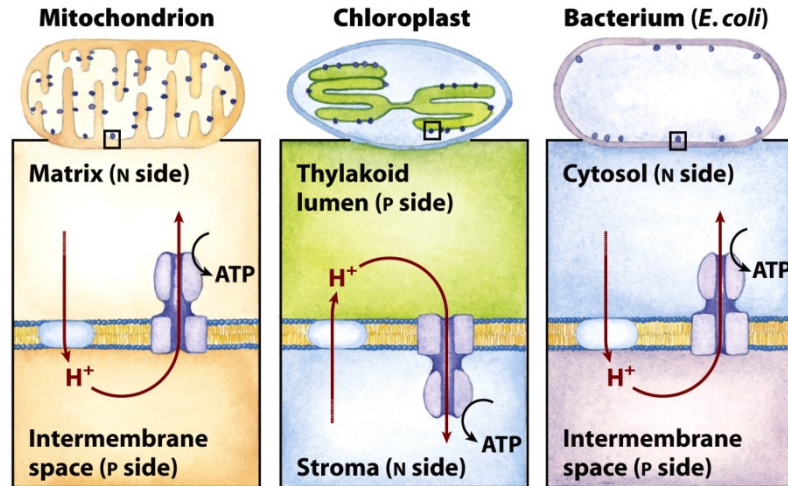


Figure 19-64
Lehninger Principles of Biochemistry, Fifth Edition
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Just had a question on the cyclic Z scheme: The reason why there is a cyclic Z scheme, is so when we don't need that many NADPH we just produce ATP, right? (I had written down NADP+ but it doesn't make sense since the reactions produce NADPH not NADP+) Then the electrons from NADPH just get transferred back to Cyt b/f complex and they just cycle through Photosystem I.

Exactly. Instead of reducing $NADP^+$ to NADPH (which the plant might not need at that moment), the energy is transferred to the cyt b/f complex and used to generate ATP.

Also, is there any strategy you could give me to study for the final. I really want to do well because I was not able to score well enough on the first midterm.

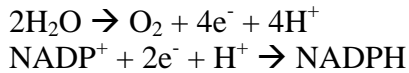
Study from now until 7:00 tomorrow without any distractions. You may want to listen to a little Gordon Lightfoot to get yourself pumped! If that doesn't work try Anita Baker.

Is the old material going to be detailed (as in the transamination question of serine or calculations of how many protons we get from 1 NADH) or is it mostly concepts?

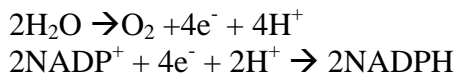
If we spent a good deal of time on it, it is fair game for the final. If we didn't, it is also fair game, but it is unlikely that I would put it on the exam.

In PS I, electrons from plastocyanin go through the excited chlorophyll P700 which then transfers its electrons to Ferredoxin which carries its electrons to NADP⁺ reductase. This process must happen twice since four electrons are required by NADP⁺ reductase in order to reduce 2 NADP⁺ to 2 NADPH. In light of this, would the net result of 2 H₂O molecules be 8H⁺ PS II and 2 NADPH molecules from PS I?

That is correct. If we look at the 4 e⁻ oxidation of water and the 2 e⁻ reduction of NADP⁺:



When we add these together, we must double the NADP⁺ reduction so that electrons cancel:



And we get:



Looking at the structure of cholesterol it has many hydrophobic CH₂ groups making it mostly hydrophobic. However, it does have a hydroxyl polar end. Therefore, would it be more proper to call cholesterol amphipathic?

You could, because that is the definition of amphipathic – a molecule that has a polar region and a non-polar region. Despite this, cholesterol is very hydrophobic overall. The amount of it that is polar is very small compared to the amount of it that is non-polar.

You explain that HMG-CoA which is produced during Ketone Body synthesis in the matrix is used both in the matrix (for ketone body synthesis) and also in the cytosol for cholesterol synthesis. How is it used in both areas at once?

HMG-CoA is **NOT** produced only in the matrix and then transferred to the cytosol. HMG-CoA is produced in the matrix by enzymes in the matrix (for ketone body synthesis), and HMG-CoA is produced in the cytosol (for cholesterol biosynthesis) by enzymes in the cytosol. Of course, acetyl-CoA must be transported from the matrix to the cytosol for cholesterol biosynthesis.

After reviewing the cholesterol synthesis lecture from Tues, I noticed there are no enzymes listed for the reactions. So, to clarify what we will be tested on, you stated that we need to know structures of intermediates up to the formation of squalene. But, after squalene, just know there are multiple steps to cholesterol and of course cholesterol's structure?

Exactly!

Will you be testing us on material that was covered in the supplementary slides, but wasn't covered on your original notes?

What we talked about in class, yes.

I was relistening to the heme lecture and I am still unsure of the structures you would like us to know. So, could you specify the heme molecules you would like us to know to the point of drawing their structure for the exam. I know for sure you mentioned ALA, heme, protoporphyrin IX (and I think you mentioned uroporphyrinogen III), but am unsure about others in particular the heme degradation structures.

Exactly. Know those: ALA, protoporphyrin IX and heme. Understand what is happening between ALA and protoporphyrin IX.

This is not an actual question but I have received a lot very similar to this:

I am working two jobs, studying for my MCAT's and taking three classes. I absolutely need to get an A in your class or I will be killed by medical school assassins. What can I do? Can I do an extra credit assignment if I don't get an A?

I don't know, but you may want to cut back on your workload a bit!

I can't change the class or the exams or make any special accommodations for scenarios like this. It is not fair to the other students and it is not how I do things.

Will the 153C final tomorrow have a short answer section?

Yes.

and what will the distribution of the old and new material be? Will it be 2/3 new material, and 1/3 old material? or 1/2 for each?

Probably a little more review stuff, because we have only two lectures of new stuff.