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| --- | --- |
| **Cellular Respiration** | **Photosynthesis** |
| Aerobic (requires oxygen)  C6H12O6 + 6O2 (enz)->6CO2 +6H2O  C6H12O6 -> 6CO2 = oxidation  6O2  -> 6H2O = reduction  Exergonic (releases energy/break down)  3 parts  A)GLYCOLYSIS:  - all organisms must undergo  - net gain of only 2 ATPS, although 4 are produced, because 2 were used to start it  - occurs in cytoplasm  - glucose broken down into pyruvate  - anaerobic, because it does not require oxygen  - 2 pyruvates, 2 ATPs, 2 NADHs  B)KREBS CYCLE (+PRE-KREBS):  - breaks down/completely oxidizes pyruvate down into CO2 &  - occurs in mitochondrial matrix  - produces most NADHs  - 6CO2s, 2 ATPs, 8 NADHs, 2FADH2s  C)ELECTRON TRANSPORT CHAIN (chemiosmosis/oxidation phosphorylation)  - takes place in mitochondrial membrane  - makes 34 ATPs  - chain of proteins embedded into membrane  - ATP synthase = ATPs + 6H2O  Approximately 38 ATP  If anaerobic (no oxygen) :  yeasts with plants -> alcohol fermentation  Animals -> lactic acid fermentation  glycolysis & krebs – substrate level phosphorylation (34ATP) | 6CO2 +6H2O (light/chlorophyll enz)-> C6H12O6 + 6O2  6CO2  -> C6H12O6 = reduction  6H2O -> 6O2 = oxidation  ^ATP goes in  Endergonic (absorbs energy/build up)  2 parts  A)LIGHT REACTIONS:  - takes place in thylakoids of chloroplasts  - chlorophyll absorbs sunlight  - requires light/light dependent  1) cyclic - only ATP made (photosystem 1)  2) noncyclic – water is split, generates  oxygen, H picked up by NADP, electrons go down 2 chains -> makes ATP (photophosphorylation), goes through photosystem 2 before photosystem 1  B)CALVIN CYCLE:  - NADPH + ATP go in from light reactions  - takes place in the stroma of the chloroplast  - Rubisco (most common enzyme) grabs CO2, adds it to 5 carbon Ruby P + G3Ps, which makes glucose  - light independent  \*\*know photorespiration  \*\*no need to know ATP totals for photosynthesis. |

^both processes involve electron transport.

Know both overall reactions. OIL RIG

\*\* know diagrams of both processes and what goes in and out

**Photorespiration**

-shuts stoma, so the CO2 can’t get in, & the plant starts trying to put oxygen in Calvin Cycle, but then you don’t get two G3Ps, so it can’t make glucose, and the plant…says goodbye

Two mechanisms that have evolved to help some plants, C4 & CAM plants

C4 has a different enzyme called pepcase (no rubsico) grabs CO2 when the stoma are open and delivers to a special place called the bundle sheet cells (requires ATP), so when it’s really hot, C4 is better off than C3.

So if the stoma of the C3 is open, it’s better because then C4 would be inefficient. But in tough environments, C4 is better.

CAM only opens stomata at night and stores CO2 in the central vacuole. Has thick leaves which are full of water, can go through light reactions and stuff whenever they need to, they just need the CO2, which they can get at night and store up.

Chemiosmosis occurs in the inner membrane space of mito in respiration.

\*\*label diagrams of mitochondria (cristae-folds [more surface area], etc) &chloroplasts

Carbs broken down to produce energy in resp

Psyn: Can take the G3Ps to make stuff other than glucose at the end of the Calvin Cycle

Glucose – fast, quick, lipids – long term energy

Chemical bonds are potential energy (ultimately comes from the sun ->autotrophs->heterotrophs)

All organisms undergo respiration

Machinery for photosynthesis – sun, chlorophyll, enzymes, etc.

When you split water, electrons ->photosystem 2->photosystem 1-> taken by NADP to the Calvin Cycle, ultimately ends up in the bonds of glucose

NADH ->respiration, NADPH -> photosynthesis

Know electromagnetic spectrum, wavelengths measured in nanometers, red is the longest, violet the shortest

Plants are green absorb red and blue, reflect green

Pigments; carotenoids (orange), xanthophylls (yellow/red); only see them when the chlorophylls start to be reabsorbed

Might be a question about the lab