CATABOLISM: CHEMOTROPHY vs. PHOTOTROPHY

The table below (with the supplementary whiteboard diagram) expands on the introductory handout to clarify the differences between the chemotrophic and phototrophic processes of catabolism. It still maintains the generalized aspect of not showing specific pathways and cycles, but rather the end result. The **electron acceptors** indicated are “external” for the respirers: O_2 for aerobic respiration and an “O_2-substitute” (examples: nitrate, sulfate) for anaerobic respiration.

The terminology associated with the nature of the **electron donor** applies to both Chemotrophy and Phototrophy. Those which utilize an **organic** electron donor are termed **organotrophs**, and those which utilize an **inorganic** electron donor are **lithotrophs**. Of the phototrophs, those which oxidize H_2O and evolve O_2 are termed <u>oxygenic phototrophs</u>, and those which use other electron donors and do not evolve O_2 are <u>anoxygenic phototrophs</u>.

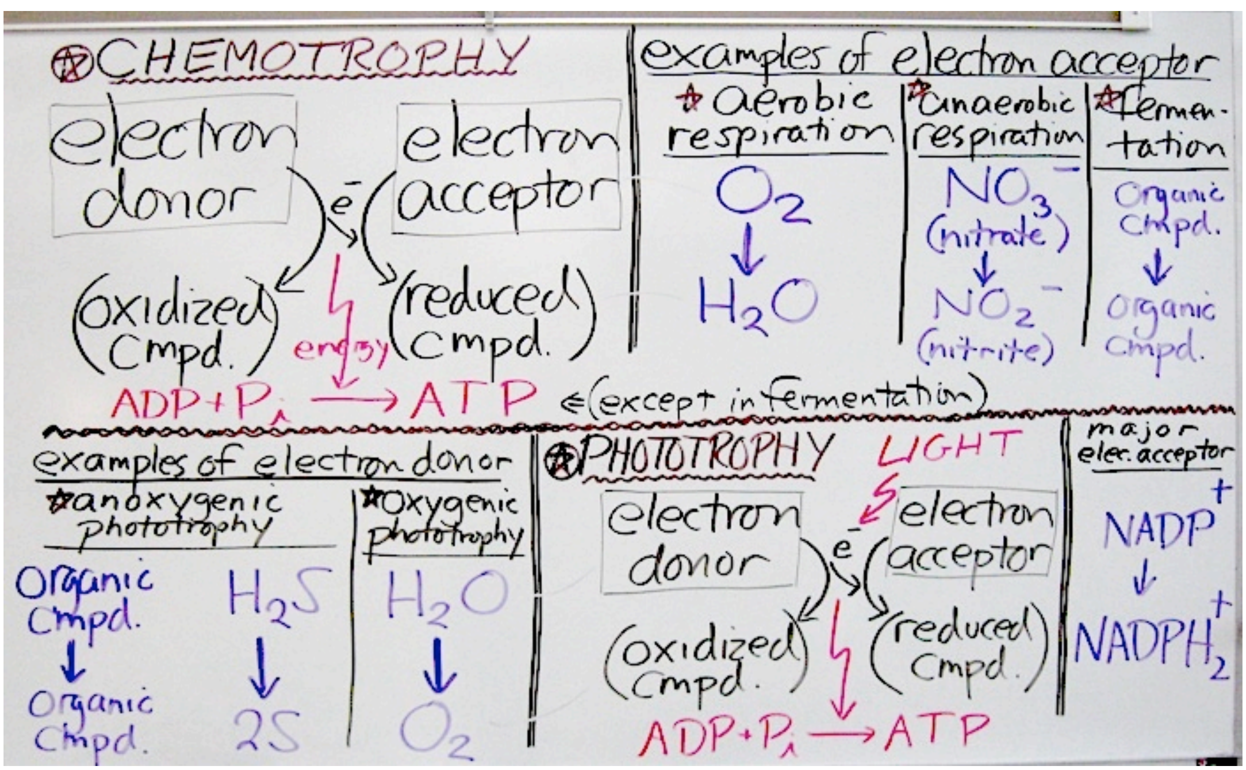
catabolic categories		electron donor	light essential?	phosphorylation	major electron acceptor	
CHEMOTROPHY	aerobic respiration	organic or inorganic	−	oxidative	O_2	external
	anaerobic respiration	organic or inorganic	−	oxidative	“O_2-substitute”	
	fermentation	organic	−	substrate-level	organic cmpd.	internal
PHOTOTROPHY*	oxygenic phototrophy	inorganic (H_2O)	+	photo	$NADP^+$	
	anoxygenic phototrophy	inorganic (e.g., H_2S) or organic	+	photo	$NADP^+$	

*<u>**Examples of phototrophs**</u>:

Electron donor is H_2O; O_2 is evolved: PLANTS, ALGAE, CYANOBACTERIA.

Electron donor is H_2S; elemental S is evolved: PURPLE AND GREEN SULFUR PHOTOSYNTHETIC BACTERIA.

Electron donor is organic: PURPLE NON-SULFUR PHOTOSYNTHETIC BACTERIA.



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