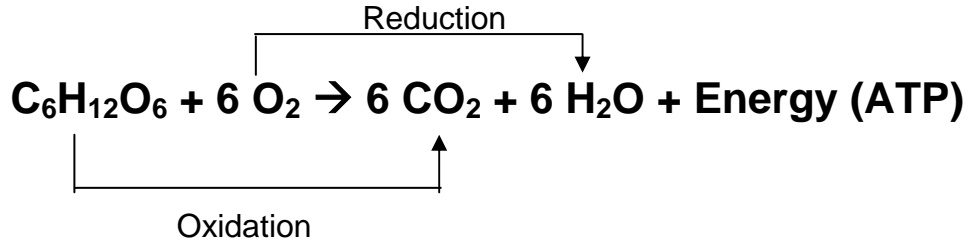


Biology 20
Cellular Respiration

What is respiration?

What is the main function of cellular respiration?

RESPIRATION EQUATION:



Reference: p. 119 → *Key = follow the H⁺s.

Oxidation:

Reduction:

Is cellular respiration a catabolic or anabolic reaction?

Overview of Cellular Respiration (p. 119; Fig. 7.2 and p. 120, Fig. 7.3).

Aerobic respiration:

- 1)
- 2)
- 3)

Anaerobic respiration or Fermentation:

- 1)
- 2)
- a)
- b)

Glycolysis: (p. 122; Fig. 7.5)

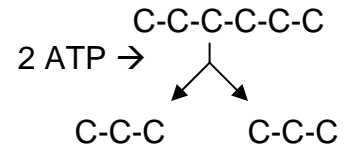
Refers to:

Occurs:

Energy investment phase: Steps 1 – 4

How many ATP's required (used)?

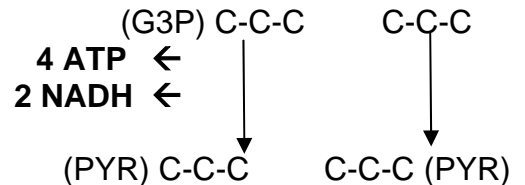
Results in 2 molecules of 3 phosphoglyceraldehyde (G3P)



Note: Step 5 is an isomeration step between G3P & Dihydroxyacetone phosphate

Energy yielding phase: Steps 6 – 10

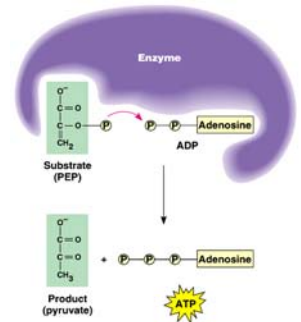
Results in: ___ pyruvates
 ___ ATP produced
 ___ NADH produced



Nicotinamide adenine dinucleotide (NADH) – energy rich molecule which will be shuttled to the ETC & undergo oxidative phosphorylation to yield more (Think: Disney dollars - can only get energy at the ETC)

Glycolysis Net Yield: pyruvates:
 ATP:
 NADH:

What is Substrate-level phosphorylation?



Two fates of pyruvate:

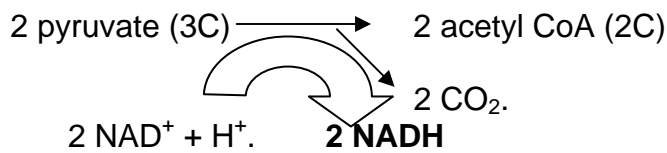
- 1) If O₂ is present:
- 2) If O₂ is not present:

Aerobic Respiration:

Glycolysis → Krebs's Cycle:

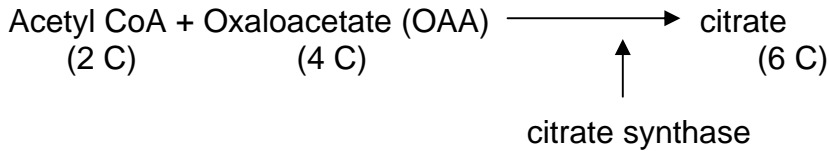
Grooming or Transition phase: (p. 122; Fig. 7.6)

Occurs where:

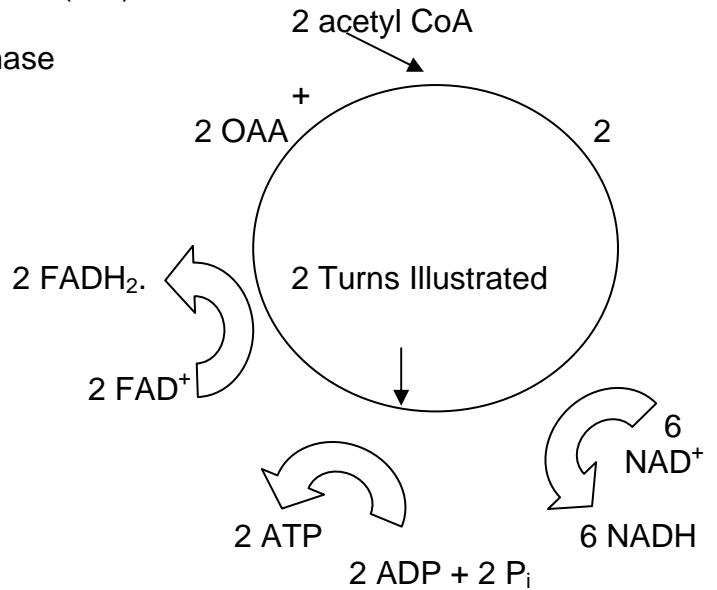


Krebs Cycle: (p. 124; Fig. 7.7)

Occurs:



Citrate



Why does it require 2 turns of the Krebs Cycle to **completely oxidize 1 glucose molecule**?

Krebs Cycle Net Yield:

- ATP
- NADH
- FADH₂.
- CO₂.

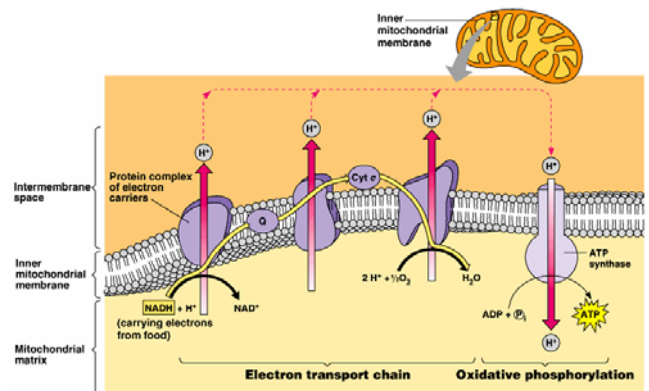
Electron Transport Chain & Oxidative Phosphorylation: (p. 126; Fig. 7.9 & 7.10)

Location:

Proteins involved: cytochromes
ATP synthase

What is chemiosmosis?

What is oxidative phosphorylation?



ATP is not produced directly. Results from H⁺ flowing through ATP synthase.

Each NADH = _____ ATP (approximately)

Each FADH₂ = _____ ATP (approximately)

Final electron acceptor?

Where does the O₂ come from?

How does the O₂ get to the cells?

Where does the water (metabolic water) come from?

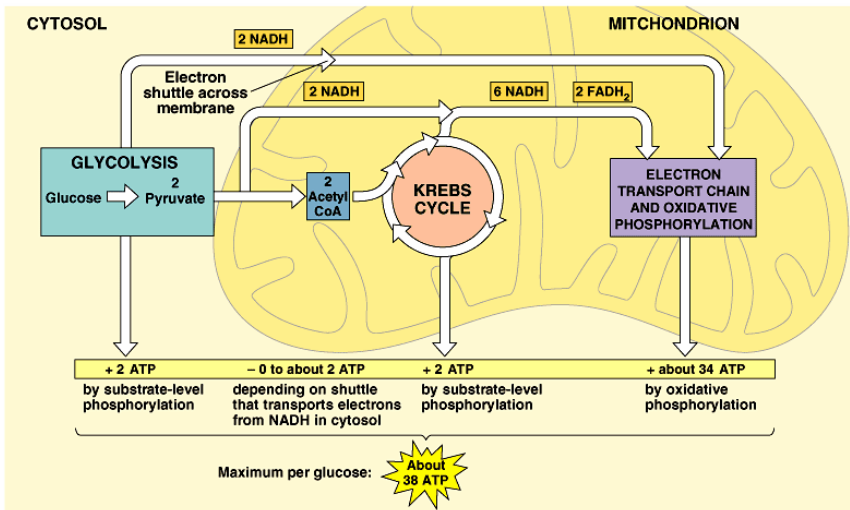
What happens when cyanide & carbon monoxide accumulate in our bodies?

Energy yield from aerobic respiration: (p. 132, Fig. 7.14)
of ATPs

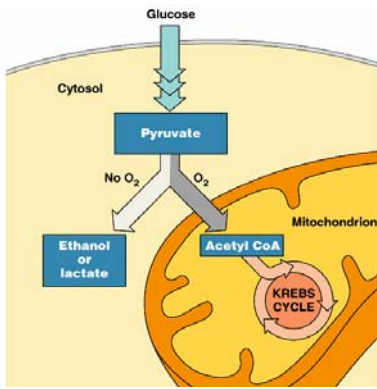
Glycolysis:	2 ATP	→	
	2 NADH	→	
Primer RXN:	2 NADH	→	
Krebs Cycle:	2 ATP	→	
	6 NADH	→	
	2 FADH ₂ .	→	_____ Total ATPs

NOTE: Eukaryotes = 36 – 38 ATPs

Do the numbers agree? Why or why not?



Fermentation: p. 132, Fig. 7.13



a) **Lactic Acid Fermentation** (p. 132, Fig. 7.13C)
(lactate)



Occurs when:
Location:
Results in:

Lactic acid build-up results in: 1)
2)

Cori cycle:

- 1) **In skeletal muscles:**
- 2) **In the liver:** Two fates lactic acid:
 - a)
 - b)

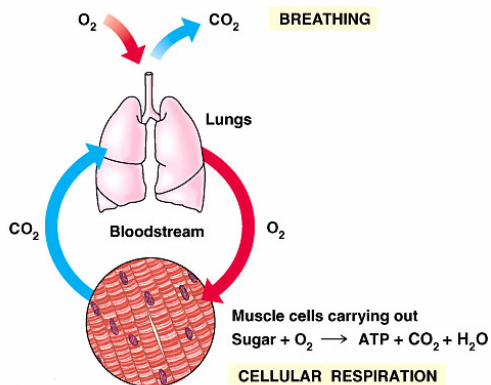
b) **Alcohol Fermentation** (p. 132, Fig. 7.13B)

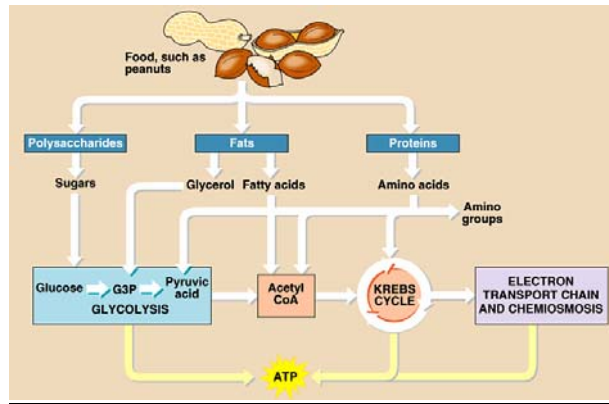


Occurs when:
Location:
Results in:

What organisms undergo this type of metabolism?

What is the connection between breathing and cellular respiration? (p. 90; Fig. 6.1)





p. 129, Fig. 7.12

LIPID METABOLISM:

Lipolysis:

Ketone bodies:

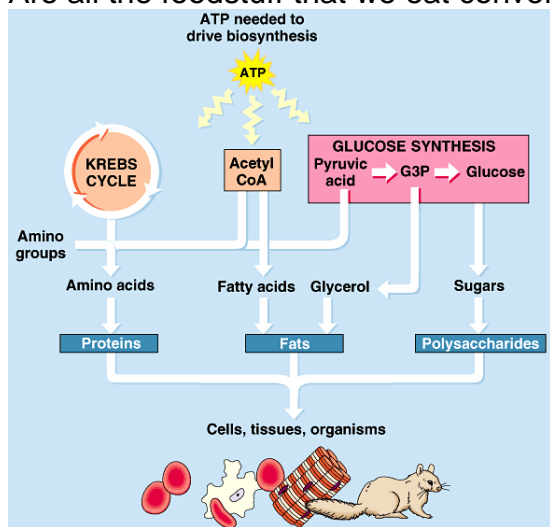
As a result of:

ketosis:

ketoacidosis:

AMINO ACID METABOLISM:

Are all the foodstuff that we eat converted into energy (ATP)? (p. 105; Fig. 6.17)



Where does the fuel for respiration ultimately come from? P. 133, Fig. 7.15