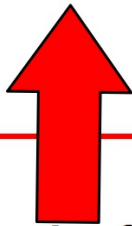


What are the 3 steps of aerobic cellular respiration?

Glycolysis
Krebs cycle
Electron transport chain



Where do each of the steps take place?

Cytoplasm
Mitochondria

How much ATP is produced in aerobic cellular respiration?

34-38

Stamp Homework- will go over tomorrow

Name 2 processes that are involved with carbon cycling between the biosphere and atmosphere?

Photosynthesis
Cellular respiration

To pick up: Anaerobic respiration notes and Venn diagram.

Objective: Students will be able to identify how a cell can release energy from sugar if oxygen is not available.

**Agenda: Warm Up
Set up Yeast Demo
Notes
Muscle Fatigue Lab
Venn Diagram**

Homework:

Set up Yeast Lab

What will I need to add to provide the yeast with food?

How can I tell if a gas is being produced?

Should I add warm or cold water?

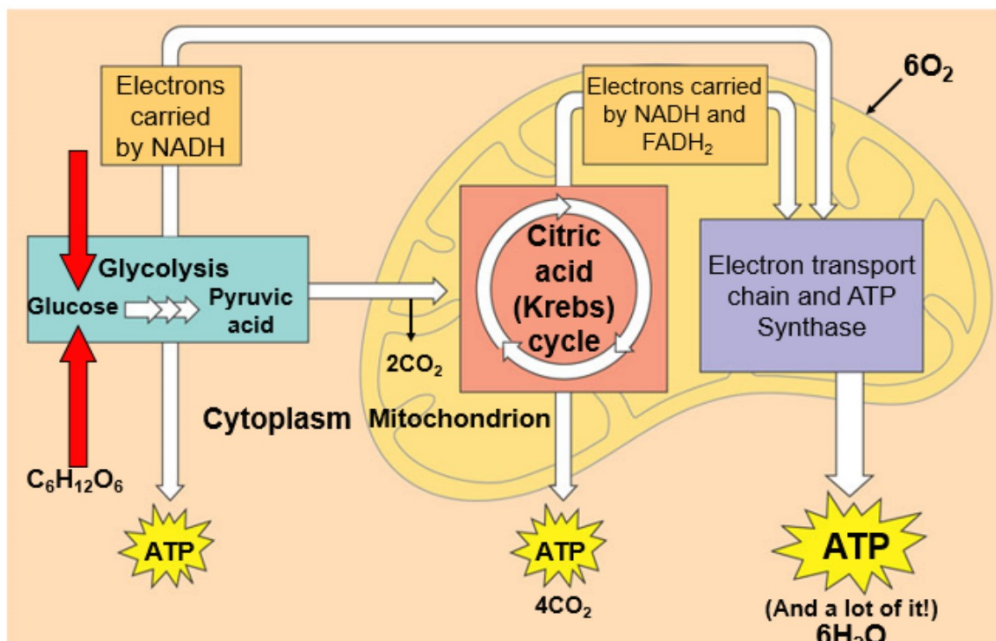
Yeast



Are yeast biotic or abiotic?

Notes: Reminder of Aerobic Cellular Respiration

Putting the Three Stages Together



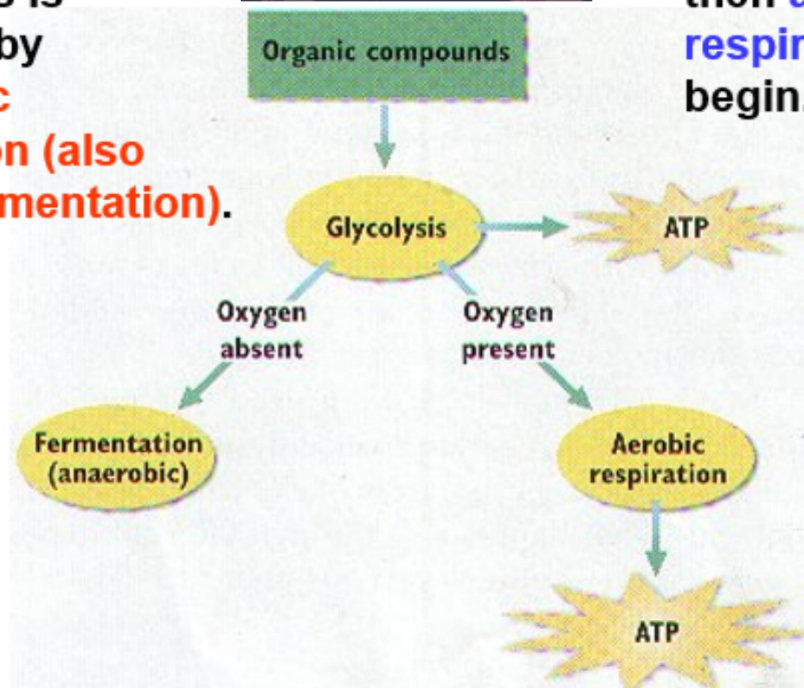
Oxygen is used in the mitochondria. It is the final acceptor in the electron transport chain and causes LOTS of ATP to be produced.

What happens if there isn't Oxygen?

If there is **no O₂** in the cell's environment, then glycolysis is followed by **anaerobic respiration (also called fermentation)**.



If **O₂** is **present** in the cell's environment, then **aerobic respiration** will begin.



Anaerobic Respiration

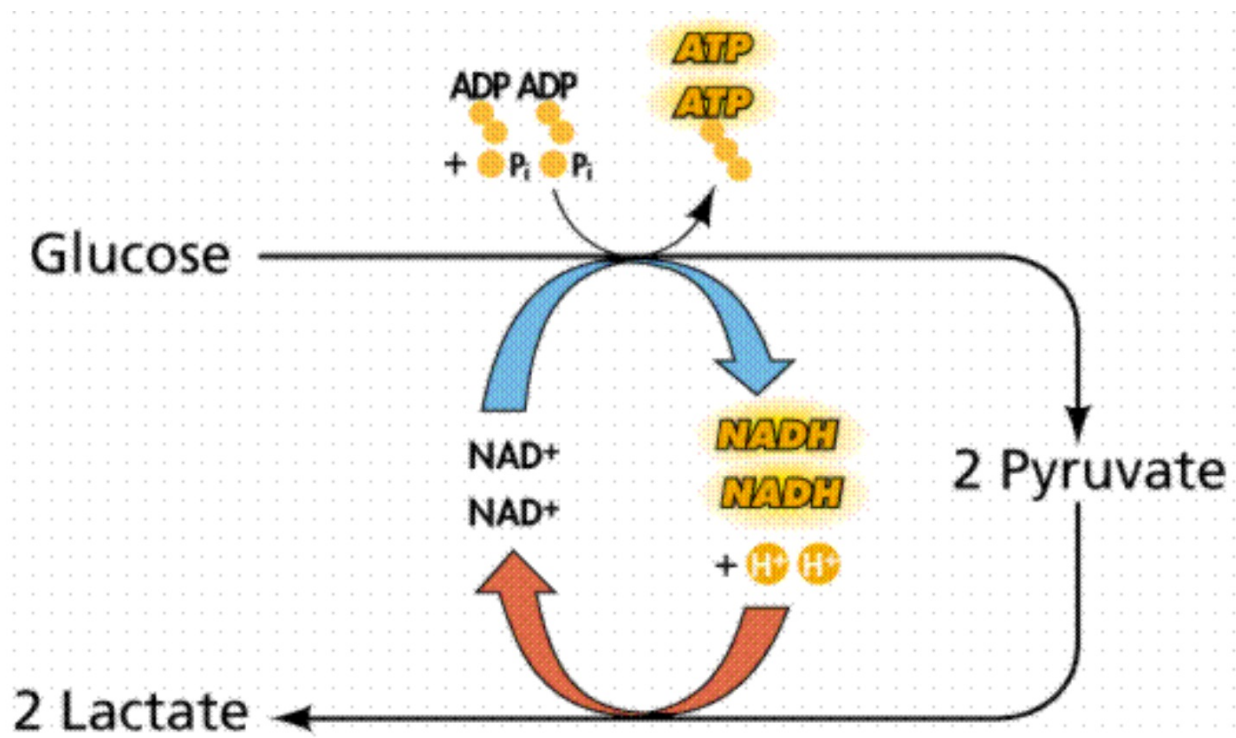
- Does NOT require oxygen
- Occurs in the cytoplasm
- Much less efficient than aerobic (cellular) respiration because only TWO molecules of ATP are formed (instead of 38).
- Two main types of Anaerobic Respiration:
 - Lactic Acid Fermentation
 - Alcoholic Fermentation



Lactic Acid Fermentation



- Used by animal cells when oxygen has run out
- Pyruvate (from glycolysis) is converted to lactic acid.
- Occurs in muscle cells, as well as in some bacteria and fungi.
- The liver converts lactic acid back to pyruvate once oxygen is available.
- **Examples:**
 - Microbes transform milk into cheese and yogurt.
 - When muscle cells run out of oxygen, the cells switch to lactic acid fermentation. This provides your muscles with just enough energy the cells need during exercise, but only for short periods of time. Side effects include fatigue, pain, cramps, and soreness.



Lactic Acid Fermentation

Alcoholic Fermentation

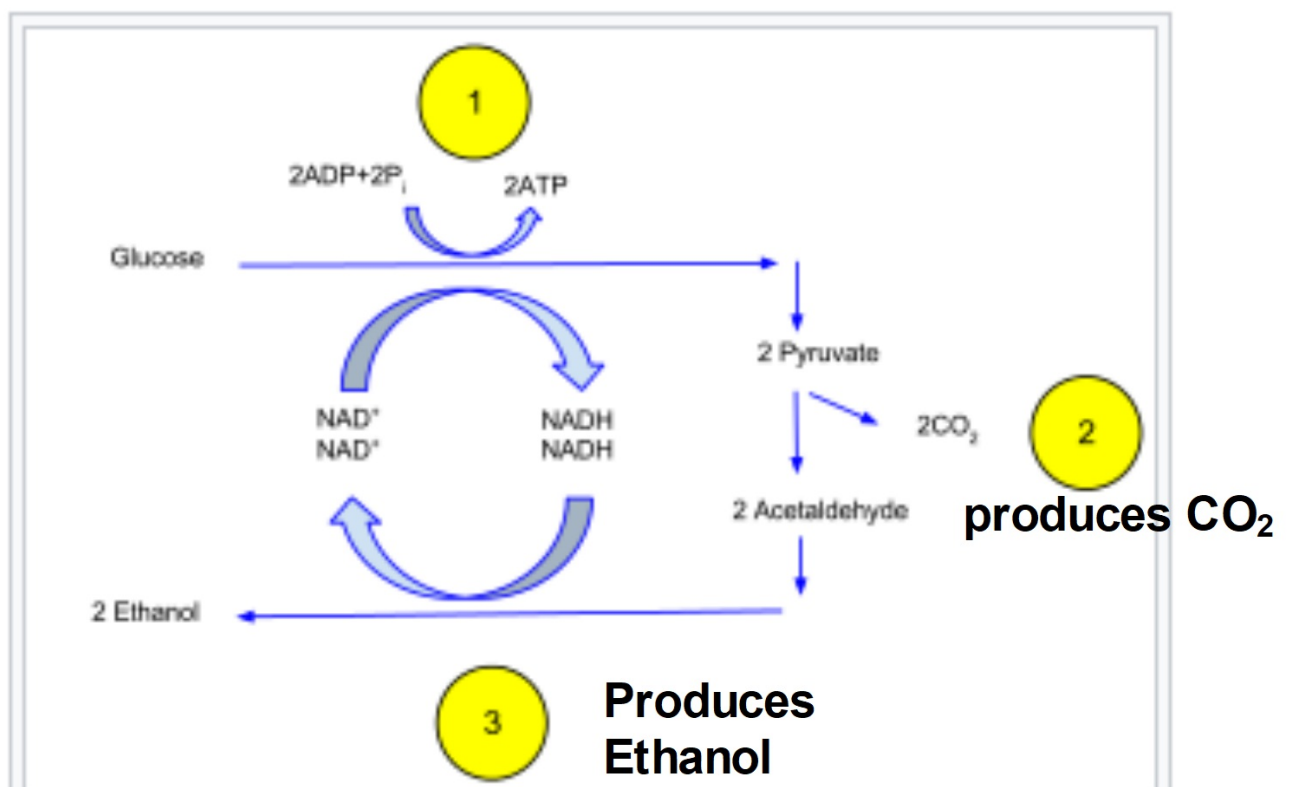
- Used by many microorganisms (ex. yeast)
- Pyruvate is converted to CO₂ and ethyl alcohol
- Examples:

- **Bakers use alcoholic Fermentation of yeast to make bread. As yeast ferments the carbohydrates in dough, CO₂ is produced and trapped in the dough, causing it to rise. When the dough is baked, the yeast cells die, and the alcohol evaporates.**



- **Alcoholic Fermentation is used in the production of wine and beer.**

Alcoholic Fermentation



Formula for alcoholic fermentation: Glucose \Rightarrow 2CO₂ + ethanol

Muscle Fatigue Lab

Muscle Fatigue Procedures

- a. Partner A holds the binder clip in their hand and squeezes as many times as possible in 2 minutes. Record the number of squeezes in each 30 sec interval.
- b. Partner B holds the binder clip in their hand and squeezes as many times as possible in 2 minutes. Record the number of squeezes in each 30 sec interval..

	# of Squeezes/ 30 sec 2 min total			
Partner A				
Partner B				

5) Did your rate of squeezing increase or decrease as time went on?

6) How did your forearm feel as you continued to squeeze?

7) What process is taking place in the muscle cells in your forearm as those cells use up the oxygen?

Lactic acid fermentation

8) What is the product of this type of respiration?

Lactic acid

9) Why can't you do this type of respiration forever?

Not enough ATP

View Yeast Experiment:

Yeast Demonstration:

Yeast (single-celled eukaryotic organisms) perform **alcoholic fermentation**. The products of alcoholic fermentation are ethyl alcohol (drinking alcohol) and carbon dioxide. This process is used to make common food and drinks. For example, alcoholic fermentation is used to bake bread. The carbon dioxide bubbles allow the bread to rise and become fluffy. Meanwhile, the alcohol evaporates. In wine making, the sugars of grapes are fermented to produce wine.

1) Are yeast biotic or abiotic?

2) What is added to the yeast for them to do cellular respiration?

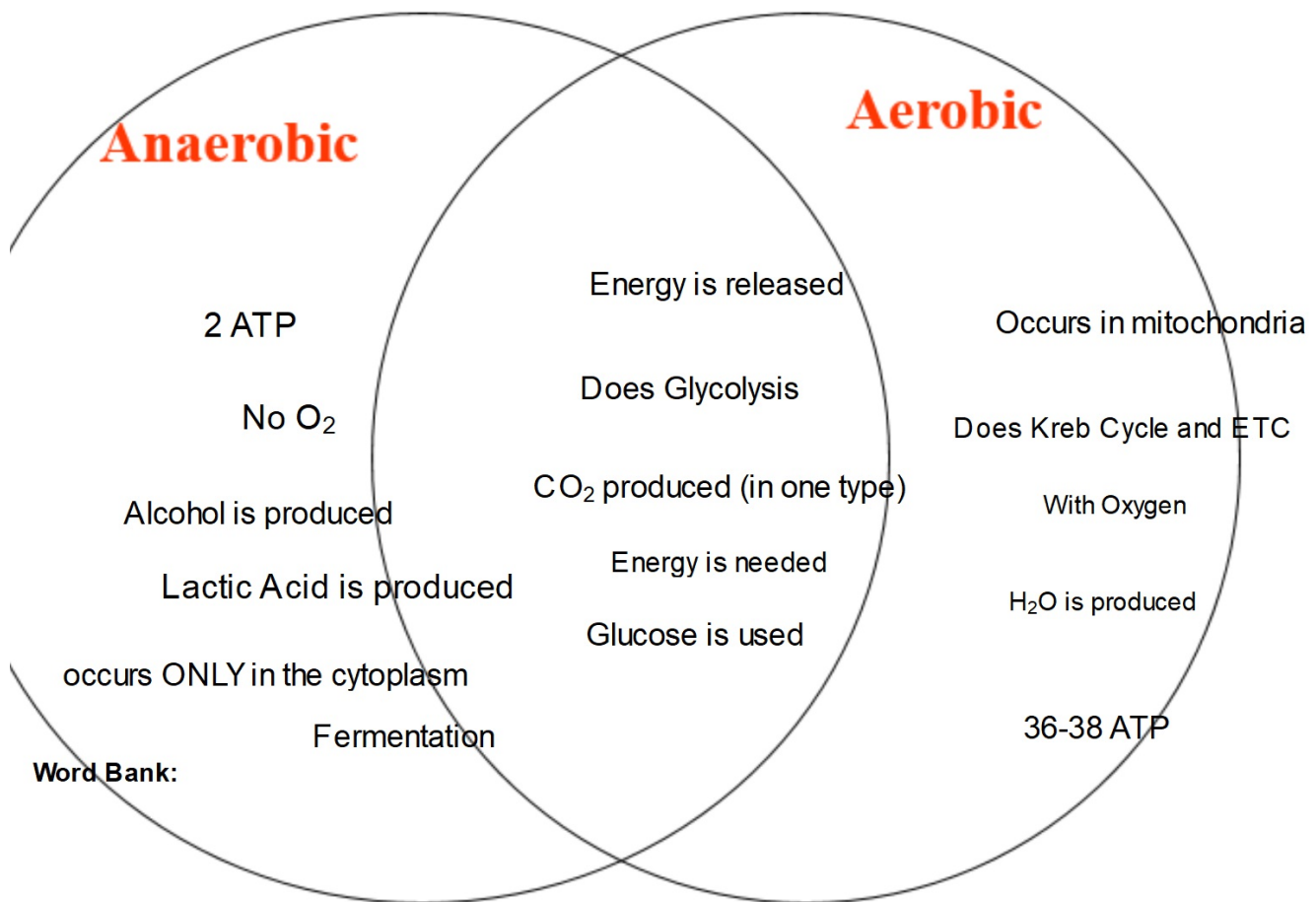
Sugar

3) What is the chemical equation that is happening in the yeast?

4) What gas is being produced? What is the evidence that a gas is being produced?

CO_2

Balloon expanded



Word Bank:

