

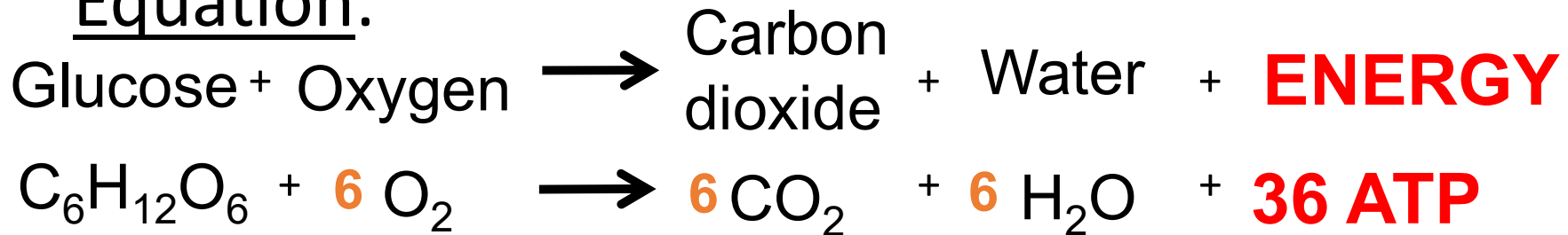
Lesson

Anaerobic Respiration / Fermentation (2 types)

Aerobic Cellular Respiration

OXYGEN is required!

Equation:



- Yields a net gain of 36 ATP (38 made, 2 are used to start the reaction) for each glucose molecule broken down

not Anaerobic Respiration (Fermentation)

- NO oxygen required
- Produces only 2 ATP per glucose
- There are 2 different types

Why do it?

- When oxygen supply is low some use it as a last resort
 - Ex. human muscle cells
- Some organisms lack enzymes & organelles needed for aerobic respiration
 - Ex. Many prokaryotes don't have mitochondria

Strongest Student Contest!

Let's see who can hold piles of textbooks for the longest period of time!



[Amoeba Sisters Fermentation](#)

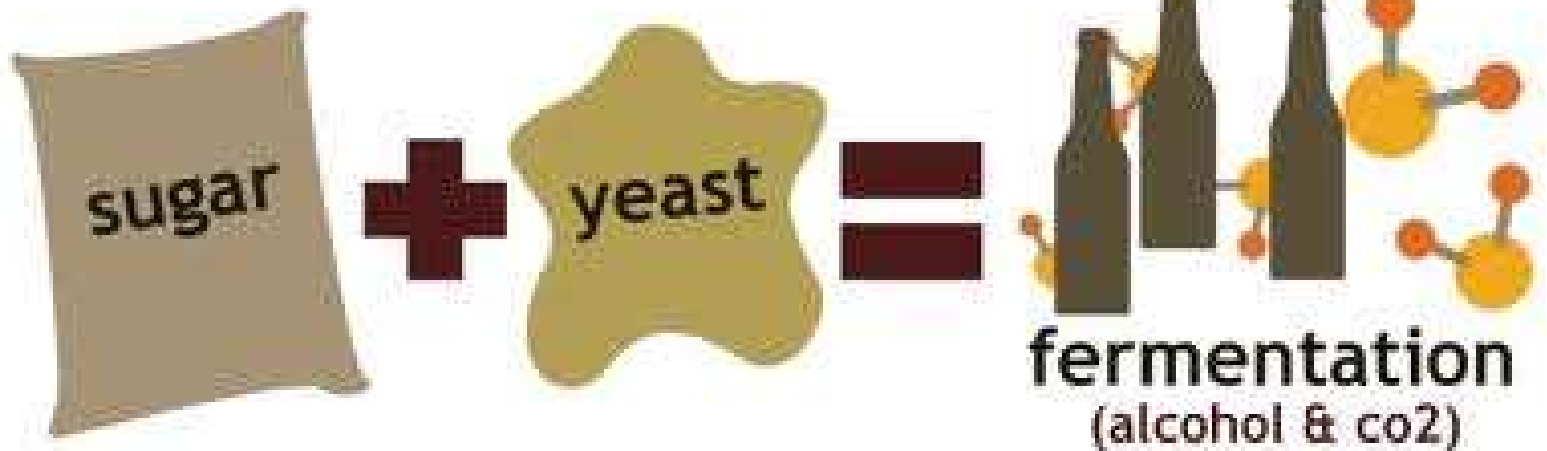
1. Lactic Acid Fermentation

- Produces lactic acid and 2 ATP
- Performed by:
 - some bacteria
 - animal cells as a last resort when lacking O_2 , associated with muscle fatigue (burning pain)
- Used in production of yogurt, sauerkraut & other fermented foods



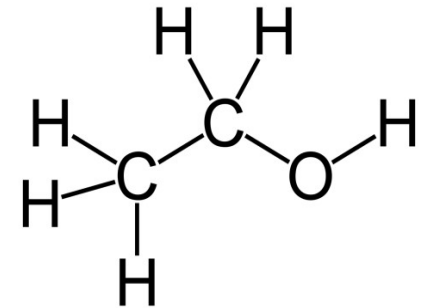
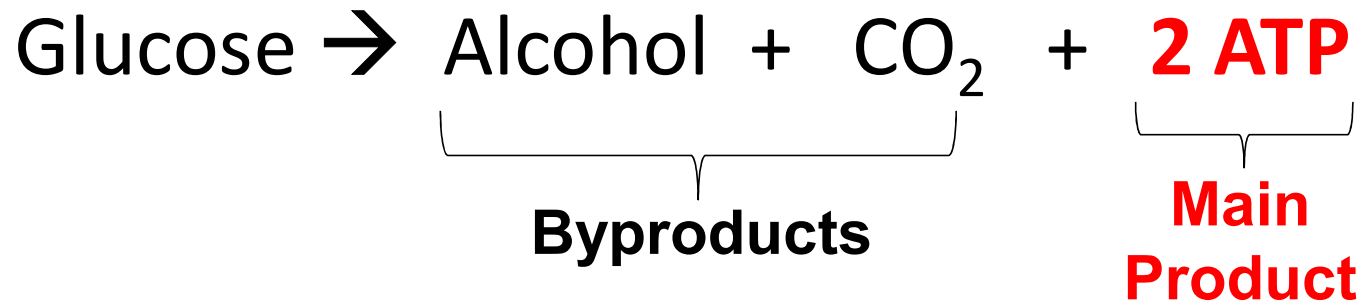
2. Alcoholic Fermentation

- Produces alcohol, CO₂, and **2 ATP** per glucose molecule
- Performed by yeast (fungi)
- Used for baking (ex. Bread rising) and for making wine and beer



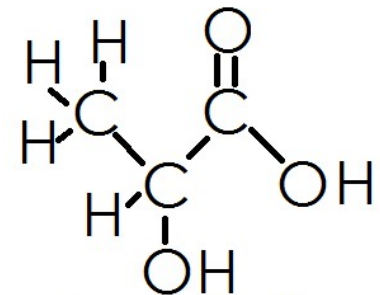
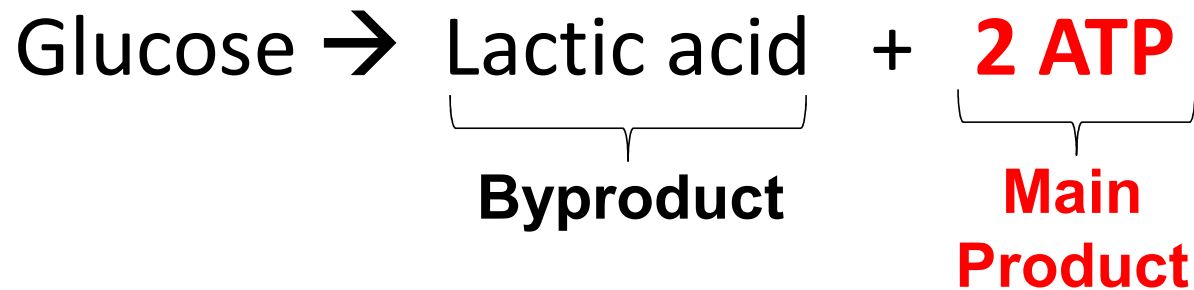
Fermentation Equations

1) Alcoholic fermentation



Ethanol Alcohol

2) Lactic Acid fermentation



Lactic Acid

Respiration vs. Fermentation

You have learned that respiration is a process that releases energy by combining oxygen with food. Respiration is not the only process that can release energy from food. A process called **fermentation** can also release energy but no breathing is necessary! Let's learn more about their similarities and differences.

Directions- Read the passage. Then look at the diagrams below which explain each process, and fill in the Venn Diagram on the following page.

Respiration is a process which releases energy from food. A great deal of energy can be released from food with this process because the food is broken down completely. All that remains is carbon dioxide and water.

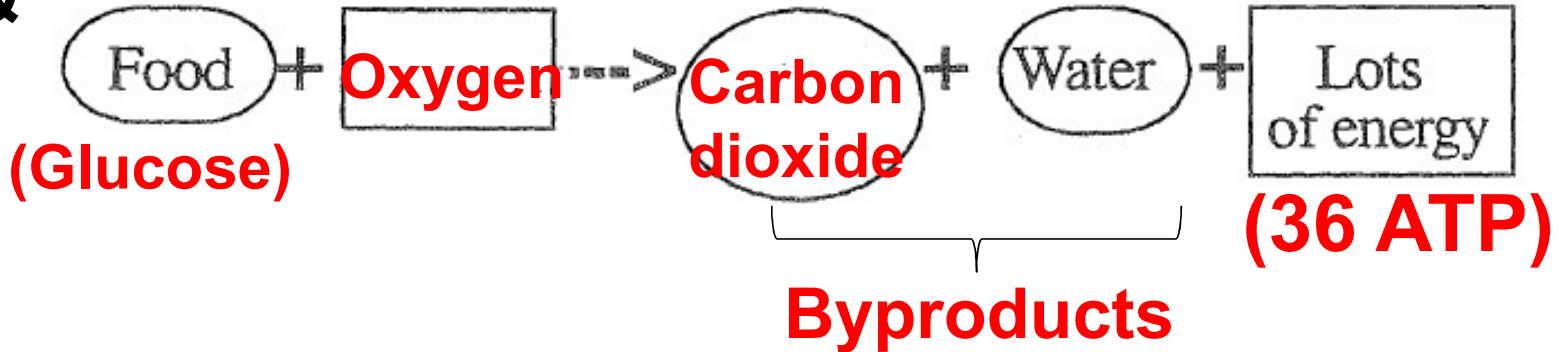
Respiration is an **aerobic** process. That means it requires oxygen. Organisms that depend on respiration cannot exist without oxygen. Most multi-celled animals depend on respiration as the principal method of releasing energy.

Fermentation is a process which liberates energy from food. The process is **anaerobic**. That means that no oxygen is required. The process is very inefficient because very little of the available energy in the food is released. As a result, the waste products such as lactic acid or alcohol have a great deal of energy left in them.

Fermentation can be the sole energy release system for some microbes. **Microbes** are one-celled organisms that can only be seen through a microscope.

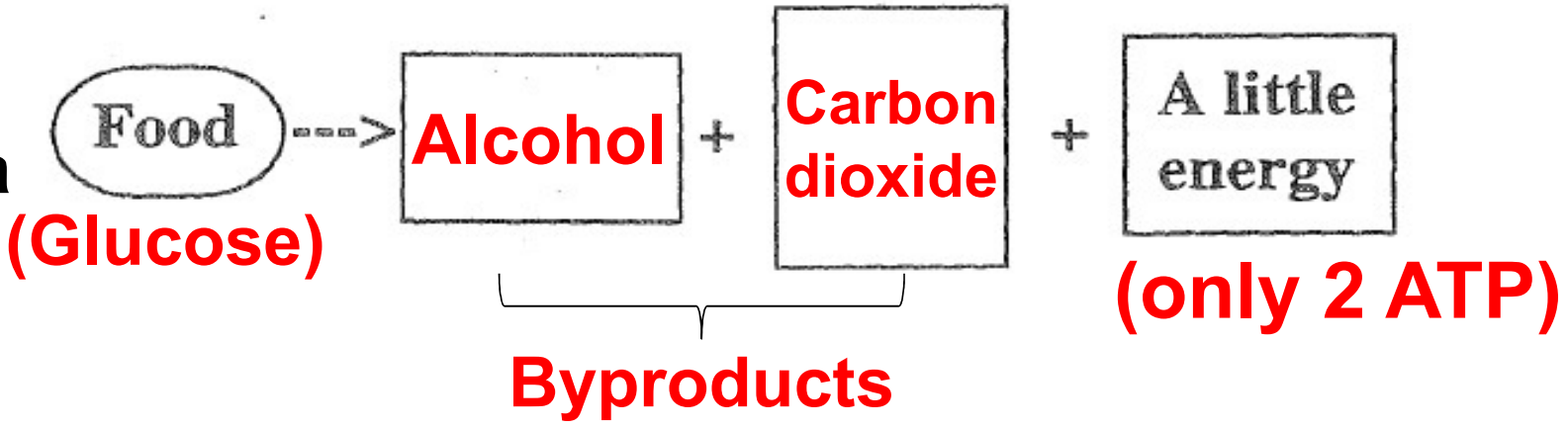
Ex.
Plants &
animals

Aerobic Respiration



Ex.
Yeast &
some
bacteria

Alcoholic Fermentation



Venn Diagram

