

Life Science
Chapter 5
Activities of Cells

5A – Order Among Cells

unicellular - the cells survive by themselves (example paramecium)

Multicellular organisms divide the functions they need to perform among their many different cells.

Tissue: group of cells that perform a particular function

Organ: groups of different kinds of tissues that work together to accomplish a particular function

division of labor: the condition in which certain organs and tissues of multicellular organisms perform specialized functions that are not being performed by other tissues and organs

turgor pressure - water pressure inside a plant cells central vacuole; causes the stiffness of the plant cell (the force behind the crispness of plants). Turgor pressure supports most leaves and flower parts and many small plants.
(permanent wilting; temporary wilting)

5B – Cellular Respiration

energy: the ability to do work

two forms of energy:

- (1) **kinetic energy:** energy in motion
- (2) **potential energy:** energy in storage

Not all energy is either kinetic or potential - example nuclear energy.

Examples of kinetic energy- light, electricity, sound, running , and breathing; heat

Examples of potential energy- battery, ball on top of hill, food

Producers and Consumers

2 basic types of organisms, based on how they obtain their energy:

(1) **Producer Organisms:** called producers (plants or algae) receive energy in the kinetic form and then store it as potential energy in sugar.

They do not eat food-they make their own food.

(**autotroph.**-an organism that manufactures its own food)

(2) **Consumer Organisms:** called consumers (animals, protozoans, fungi, humans)

Obtain the energy they need from the food they consume

Consumers can consume producers directly and indirectly.

(**heterotroph.**-an organism that uses food manufactured by other organisms - they cannot make their own food)

Two processes that enable the cell to perform its functions:

◆ Cellular Respiration

Cellular respiration is not the same thing as breathing.

Respiration sometimes means breathing (inhaling and exhaling). Cellular respiration is a process which cells use to release energy from certain molecules.

◆ Photosynthesis

----- **Quiz 5A** -----

Cellular Respiration

cellular respiration - the breaking down of an energy source by cells to obtain usable energy
the process by which cells obtain usable energy from energy sources)

Sugar (glucose) is the most common energy source in cellular respiration. (some can use fats, oils, proteins, etc.)

Cellular respiration requires many enzymes. Enzymes are catalysts (substances which help to change other substances without being permanently changed themselves).

2 types of cellular respiration:

(1) **aerobic** - requiring oxygen

(2) **anaerobic** - not requiring oxygen (some bacteria and fungi)

Most cells carry on aerobic respiration.

Aerobic Cellular Respiration

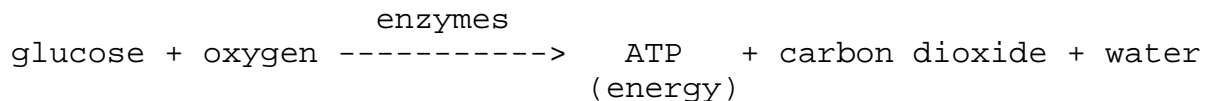
First few steps for breaking down glucose takes place in the cytoplasm. Most takes place in the mitochondrion.

Cellular respiration and photosynthesis are not the reverse of each other. (cellular respiration - no chlorophyll)

Cellular respiration - "disassembly line"

Photosynthesis - "assembly line"

Aerobic Cellular Respiration - breaks down glucose to form water, carbon dioxide, and energy.



Respiration takes stored chemical energy (food/glucose) and converts it to a ready - to - use chemical energy (ATP).

Definition of **aerobic cellular respiration**: the process by which cells use oxygen to obtain useable energy from an energy source

The aerobic cellular respiration of glucose traps, in the form of ATP molecules, approximately 50-60% of the energy that was in the glucose molecule.

Anaerobic Cellular Respiration

Some cells exist in environments that do not have oxygen available.

Many bacteria in the lower layers of swamps, lakes, or the ocean do not have oxygen.

Other cells which operate best with a supply of oxygen can occasionally operate without oxygen.

Types of anaerobic cellular respiration:

(usually named by the products that are produced from the glucose)

(1) **Alcoholic fermentation**

def.: anaerobic cellular respiration that produces alcohol and carbon dioxide from glucose

example: yeast in bread dough

(2) **Lactic acid fermentation**

def.: a type of anaerobic cellular respiration that produces lactic acid from glucose

example: yogurt, cottage cheese, buttermilk, sauerkraut, human muscle cells

A molecule of glucose broken down with oxygen produces over 15 times the amount of useable cellular energy as a molecule of glucose broken down by alcoholic or lactic acid fermentation.

----- Quiz 5B -----

5C - Photosynthesis

The primary need of all cells is energy.
Sun-the ultimate source of energy used by living things

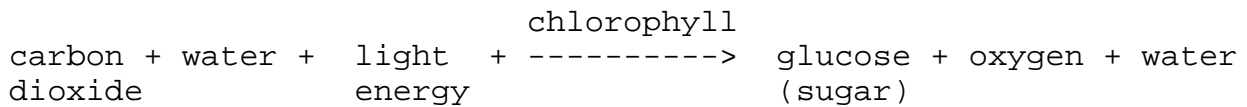
Some organisms are capable of absorbing light energy and converting it into stored chemical energy. This process is called photosynthesis.

Photosynthesis is one of the most important biological processes - because it is the essential step between solar energy and life.

This process combines carbon dioxide, water, and light energy to form glucose (a sugar) and oxygen.

For photosynthesis to occur, special pigments, and organelles (plastids) must be present.

Pigments are colored substances that absorb light energy.



In photosynthesis kinetic energy (light) is changed to potential energy (in glucose).

In order for photosynthesis to happen, catalysts must be present.

chlorophyll (a green-colored pigment) the primary catalyst of photosynthesis; most chlorophyll is located in chloroplasts

In addition to chlorophyll, plants and algae have other pigments (red, pink, yellow, brown, etc.) that also absorb light energy and may pass the energy on to chlorophyll.

----- Quiz 5C -----