

## X\_Biology\_ Life Processes (Respiration)\_ Handout 2/3

### ENERGY CURRENCY ATP ( slide 1) ATP formation from energy released during respiration

- ADP is Adenosine Di-Phosphate- has low energy content.
- ATP is Adenosine Tri-Phosphate- has high energy content.
- ATP, ADP and Pi (inorganic phosphate) are substances that are present in the cell.
- Once energy is released during respiration, it is used to make ATP molecules from ADP and the inorganic phosphate.

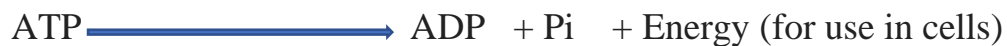


(Low energy) ( from respiration)

( High energy)

- The energy produced from respiration is converted to ATP molecules and stored.
- When the cell needs energy, then ATP can be broken down using water to release energy.

**Thus:**



- This is called ATP hydrolysis.
- Energy equivalent to 30.5 KJ/mol is released by this process. Thus, ATP is called the energy currency of cells.

### RESPIRATION IN PLANTS AND ANIMALS ( slide2)

Respiration in plants	Respiration in animals
All the parts of a plant (like root, stem and leaves) perform respiration individually.	Animals perform respiration as a single unit.
During respiration in plants, there is a little transport of respiratory gases from one part of the plant to the other.	Respiratory gases are usually transported over long distance inside an animal during respiration.
The respiration in plants occurs slowly.	The respiration in animals occurs much faster.

## **Respiration in plants: Occurs by diffusion**

- Through root hairs
  - Stems of herbs have stomata and the bark of woody stems have lenticels.
  - Leaves have stomata.
1. During day time, when photosynthesis occurs, oxygen is produced.  
**Due to photosynthesis net gas exchange in leaves during day time is:  
O<sub>2</sub> diffuses out; CO<sub>2</sub> diffuses in.**
  2. At night time, when no photosynthesis occurs, no oxygen is produced.  
So, oxygen from air diffuses into leaves to carry out respiration and carbon dioxide produced by respiration diffuses out into air.  
**Thus, due to respiration net gas exchange in leaves at night is:  
O<sub>2</sub> diffuses in; CO<sub>2</sub> diffuses out.**

## **Animals have different organs for respiration-**

- Amoeba and paramecium respire through the surface of their body that is a single cell.
- Insects breathe through spiracles, trachea.
- Earthworms through their moist and slimy skin.
- Fishes take in water through their mouths and force it past the gills where the dissolved oxygen is taken up by blood.
- Amphibians like frog, when in water, take in oxygen through their moist skin (cutaneous respiration). When on land, they respire through lungs (pulmonary respiration).
- Reptiles, birds and mammals all respire through their lungs.

## **All the respiratory organs have three common features:**

- All respiratory organs have large surface area to absorb more oxygen.
- All respiratory organs have thin walls for easy diffusion and exchange of gases.
- All respiratory organs like gills, lungs etc have rich blood supply for transporting the respiratory gases.

Since the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms.

## **HUMAN RESPIRATORY SYSTEM**

**(slide 3& 4)**

- The main organs of human respiratory system are: Nose, Nasal passage, Trachea (wind pipe), Bronchi, Lungs and Diaphragm.
- The human respiratory system begins from the nose. The air then goes into nasal passage.
- When air passes through the nasal passage, the dust particles and other impurities present in it are trapped by nasal hair and mucus so that clean air goes into lungs.
- The part of throat between the mouth and wind pipe is called pharynx.
- From the pharynx the air then goes into the wind pipe.
- The trachea does not collapse even when there is no air in it because it is supported by rings of soft bones called cartilage.
- The trachea runs down into the chest cavity and divides into two smaller tubes called bronchi.
- Bronchi are connected to the two lungs.
- The lungs lie in the chest or thoracic cavity that is separated from abdominal cavity by a muscular partition called diaphragm.
- Each bronchus divides into still smaller tubules called bronchioles inside the lungs.
- The bronchioles end into small balloon like structures called alveoli.
- The walls of alveoli are very thin and have rich supply of blood capillaries.
- Gaseous exchange takes place in the alveoli.

Source: Science text book  
Google