NOTES: 8.1 – Energy & Life (ATP)

Cell Energy: ***Energy is essential to life!!***

► all living things must be able to:

- _____;
- _____ for future use;
- _____ in a controlled way.

Which cellular activities require energy…???

- _____
- _____
- _____
- Production of proteins
- Storage of proteins

Chemical Energy and ATP

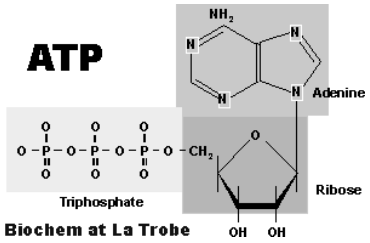
–Energy can be stored in many forms:

- _____
- _____
- _____
- _____ (CHEMICAL BONDS!)

ATP

–**A**denosine **T**ri**P**hosphate

- Adenine (N)
- 5-Carbon Sugar (Ribose)
- _____



Phosphate groups…

- Phosphate groups are _____ molecules…
- Molecules with the same charge _____ (they do not like being too close to each other)
- This means that the 3 phosphate groups on ATP are in a _____ arrangement!

ATP and Energy:

- This unstable arrangement of the 3 phosphate groups is like a _____…stored potential energy!

- The third phosphate group is so eager to get away from the other two that, when the bond is broken, **energy is released**…

- What is left over is a free phosphate group and a lower energy molecule: _____

ATP

–**A**denosine **T**ri**P**hosphate

- Adenine (N)
- 5-Carbon Sugar (Ribose)
- _____

ADP

–**A**denosine **D**i**P**hosphate

- Adenine (N)
- 5-Carbon Sugar (Ribose)
- _____

• Energy in ATP is _____ when it is converted to ADP **(Fig. 8-2).**

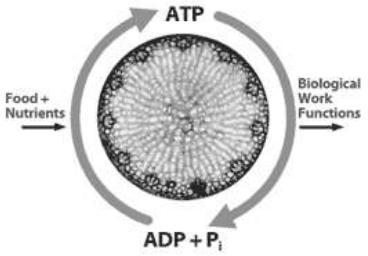
• The characteristics of ATP make it an exceptionally useful molecule that is used by _____ _____ as their basic energy source.

ATP / ADP Cycle:

• When ATP is broken down, energy is _____ and _____.

• When ADP binds with another phosphate, energy is _____ and _____.

• ATP:



-Efficient in _____

-Not very good for storing large amounts of energy long term.

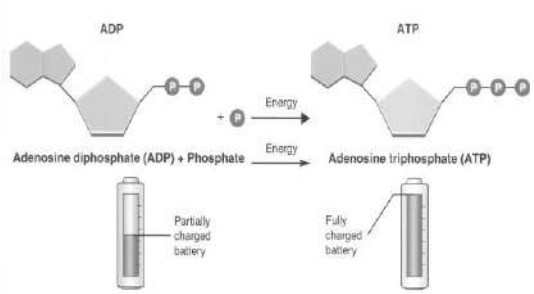
-A single molecule of sugar stores more than 90 times a molecule of ATP.

How do cells use the energy stored in ATP?

• Cellular proteins have a specific site where ATP can bind…

• When the ATP breaks down, the energy is transferred to the protein, enabling the protein to _____ _____. (e.g. _____, _____, _____)

Battery analogy:



• Sitting on a table, batteries are not of much use…

• Put the batteries into a device (calculator, cell phone, etc.) and the stored energy in the battery is put to use!

• When the battery is "dead" it can be removed and recharged…

• The energy stored in ATP is available when ATP is _____;

• Once the ATP is "dead" (is not ADP), it is released to be "_____" _____.

Heterotrophs & Autotrophs

• Cells are not "born" with a supply of ATP…they must somehow _____!

• Where do living organisms get the energy they use to produce ATP???

• **the answer**: _____**!!** (well, molecules from food)

• **HETEROTROPHS**: organisms that obtain food by _____

• **Examples:**

-**zebra**: eats plants (_____) -**cheetah**: eats animals like zebras! (_____)

-**mushroom**: absorbs nutrients from decomposing / dead organisms (_____)

• **AUTOTROPHS**: organisms that _____

•**Examples:**

-_____ -_____ -_____ -_____

*****green plants make their own food through the process of _____!**