

# 4.1 Chemical Energy and ATP

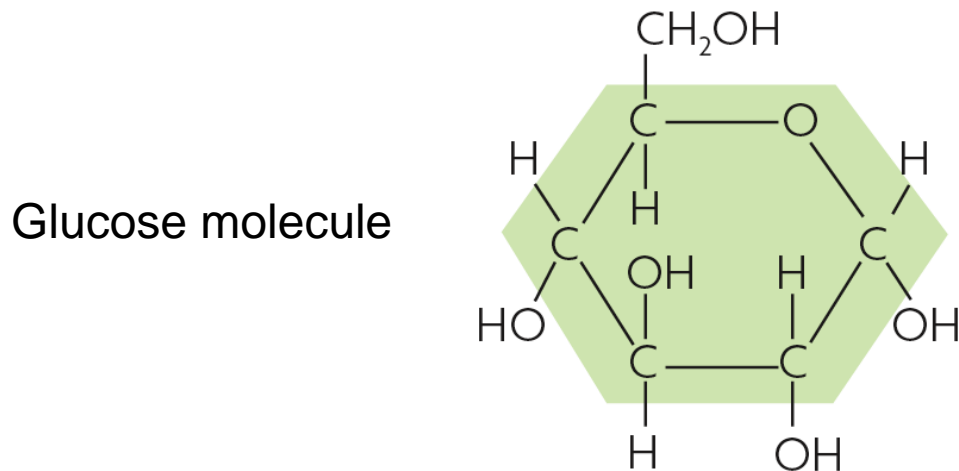
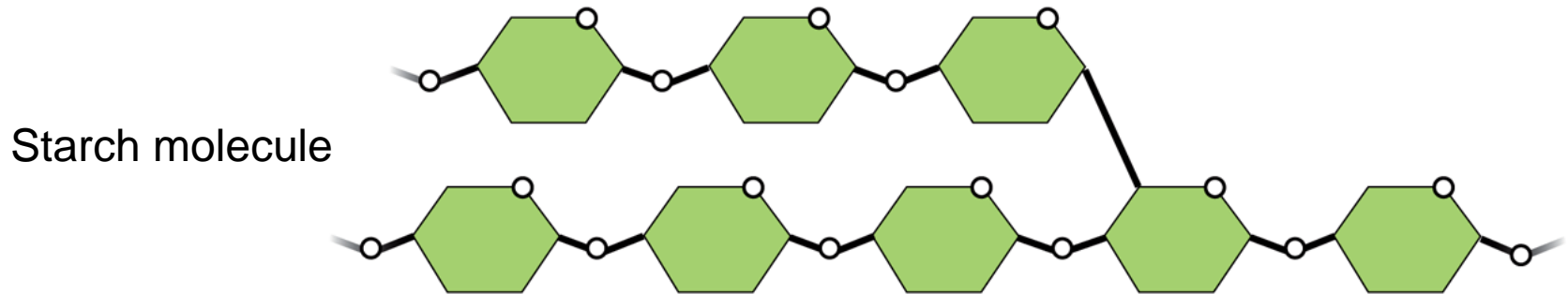
## KEY CONCEPT

All cells need chemical energy.



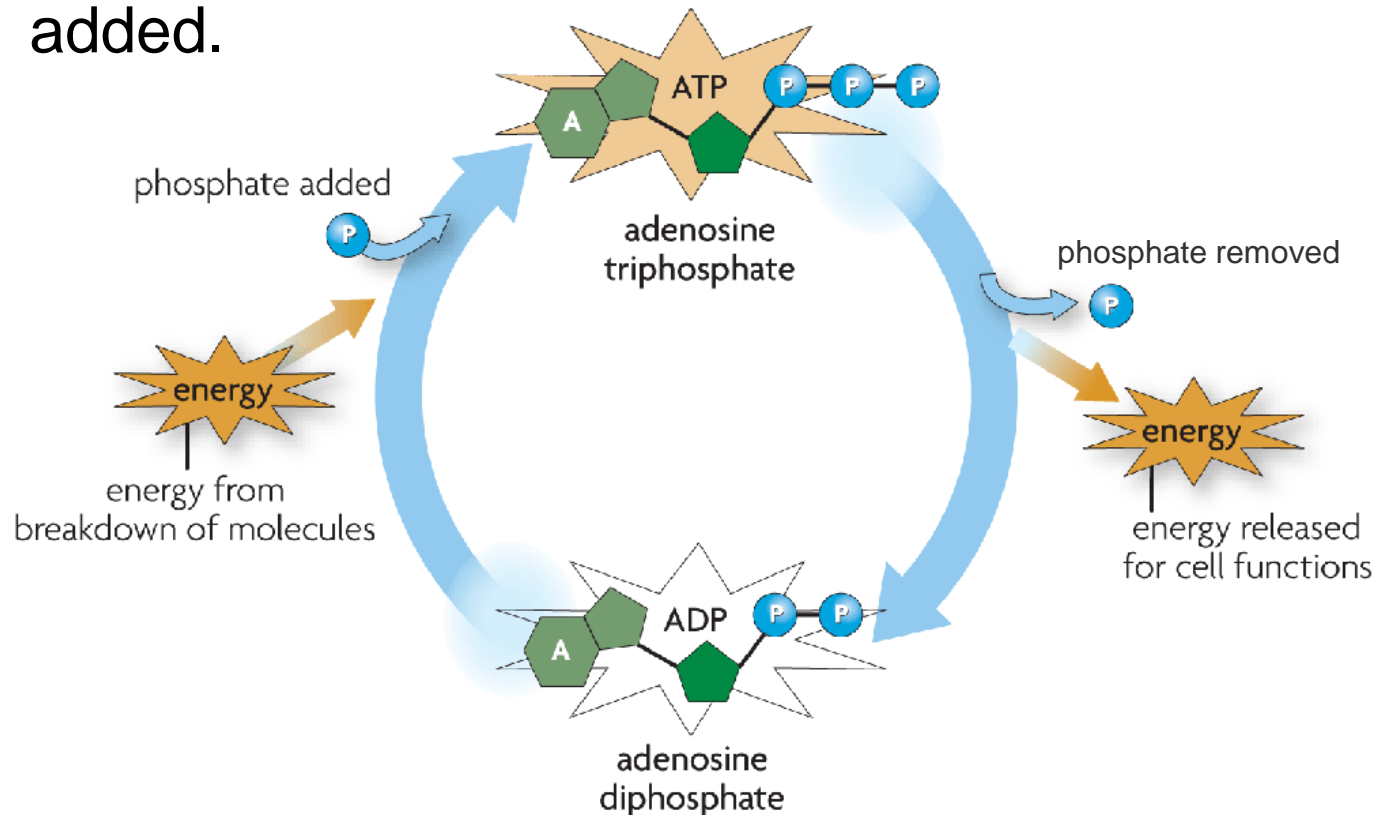
# 4.1 Chemical Energy and ATP

- ▶ **The chemical energy used for most cell processes is carried by ATP.**
- Molecules in food store chemical energy in their bonds.



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- ATP transfers energy from the breakdown of food molecules to cell functions.
  - Energy is released when a phosphate group is removed.
  - ADP is changed into ATP when a phosphate group is added.

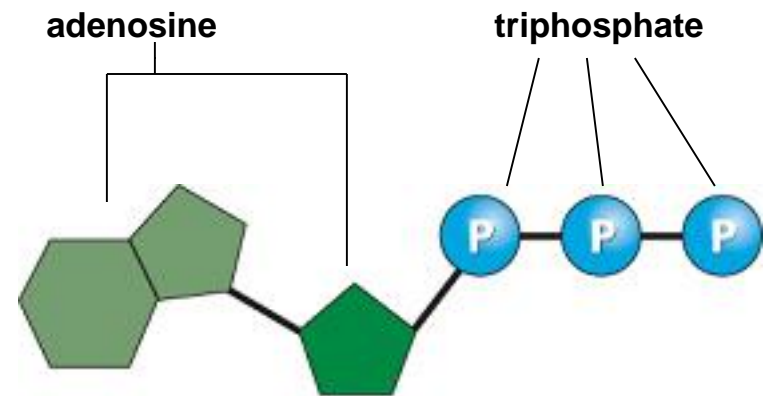


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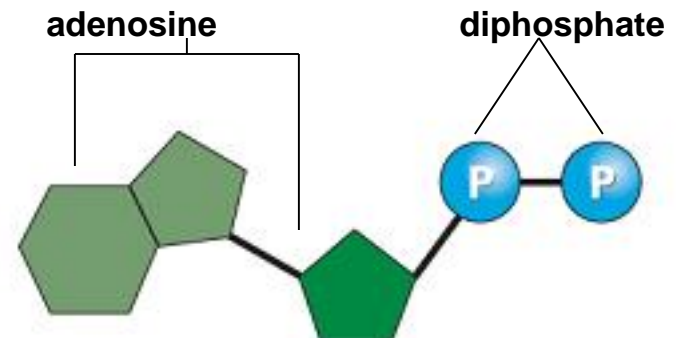
## ▶ Organisms break down carbon-based molecules to produce ATP.

- Carbohydrates are the molecules most commonly broken down to make ATP.
  - not stored in large amounts
  - up to 36 ATP from one glucose molecule

tri=3



di=2



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- Fats store the most energy.
  - 80 percent of the energy in your body
  - about 146 ATP from a triglyceride
- Proteins are least likely to be broken down to make ATP.
  - amino acids not usually needed for energy
  - about the same amount of energy as a carbohydrate

MOLECULE	ENERGY
Carbohydrate	4 calories per mg
Lipid	9 calories per mg
Protein	4 calories per mg

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- ▶ **A few types of organisms do not need sunlight and photosynthesis as a source of energy.**
  - Some organisms live in places that never get sunlight.
  - In chemosynthesis, chemical energy is used to build carbon-based molecules.
    - similar to photosynthesis
    - uses chemical energy instead of light energy

