4.5 Cellular Respiration in Detail

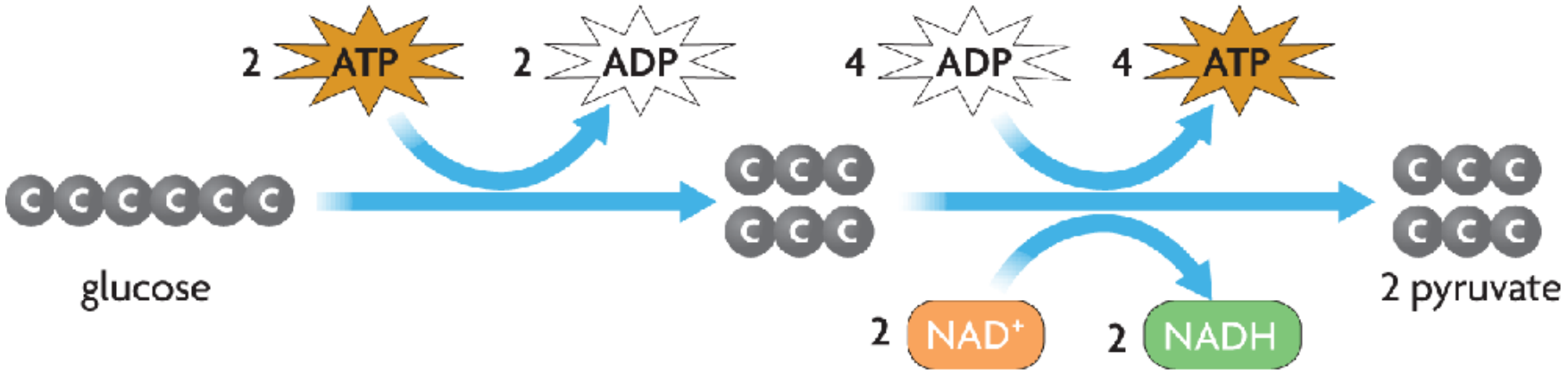
KEY CONCEPT

Cellular respiration is an aerobic process with two main stages.

4.5 Cellular Respiration in Detail

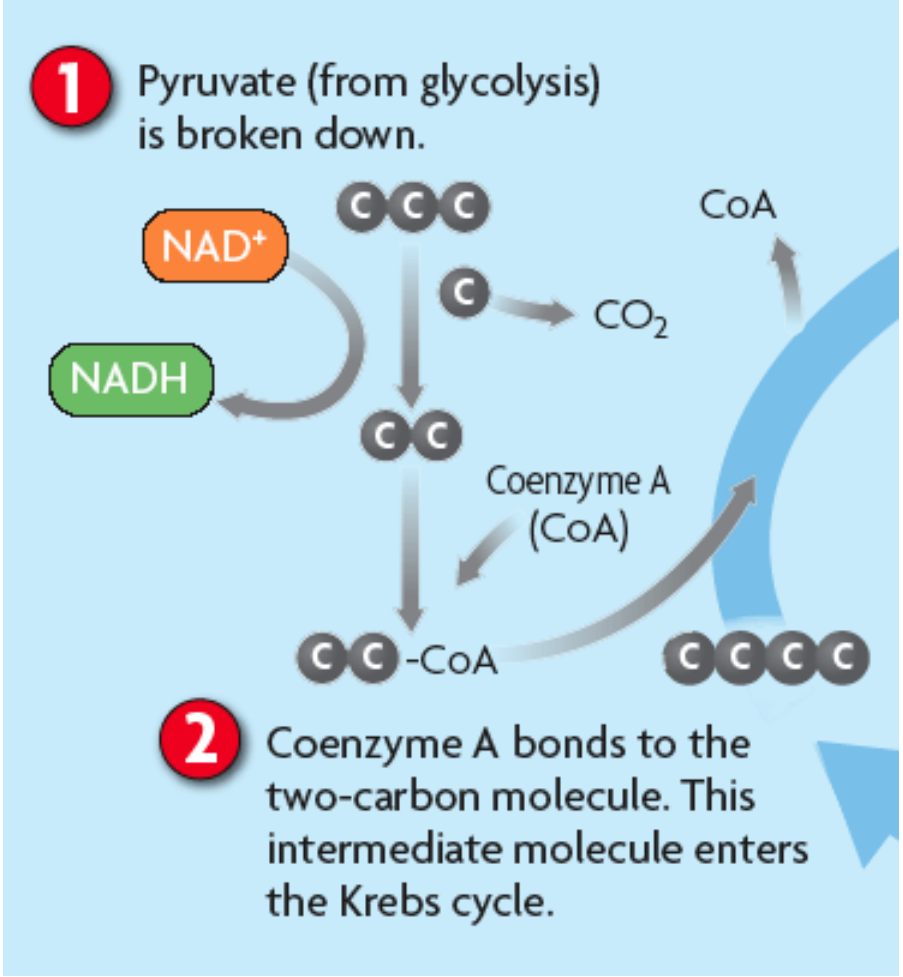
Glycolysis is needed for cellular respiration.

- The products of glycolysis enter cellular respiration when oxygen is available.
  - two ATP molecules are used to split glucose
  - four ATP molecules are produced
  - two molecules of NADH produced
  - two molecules of pyruvate produced



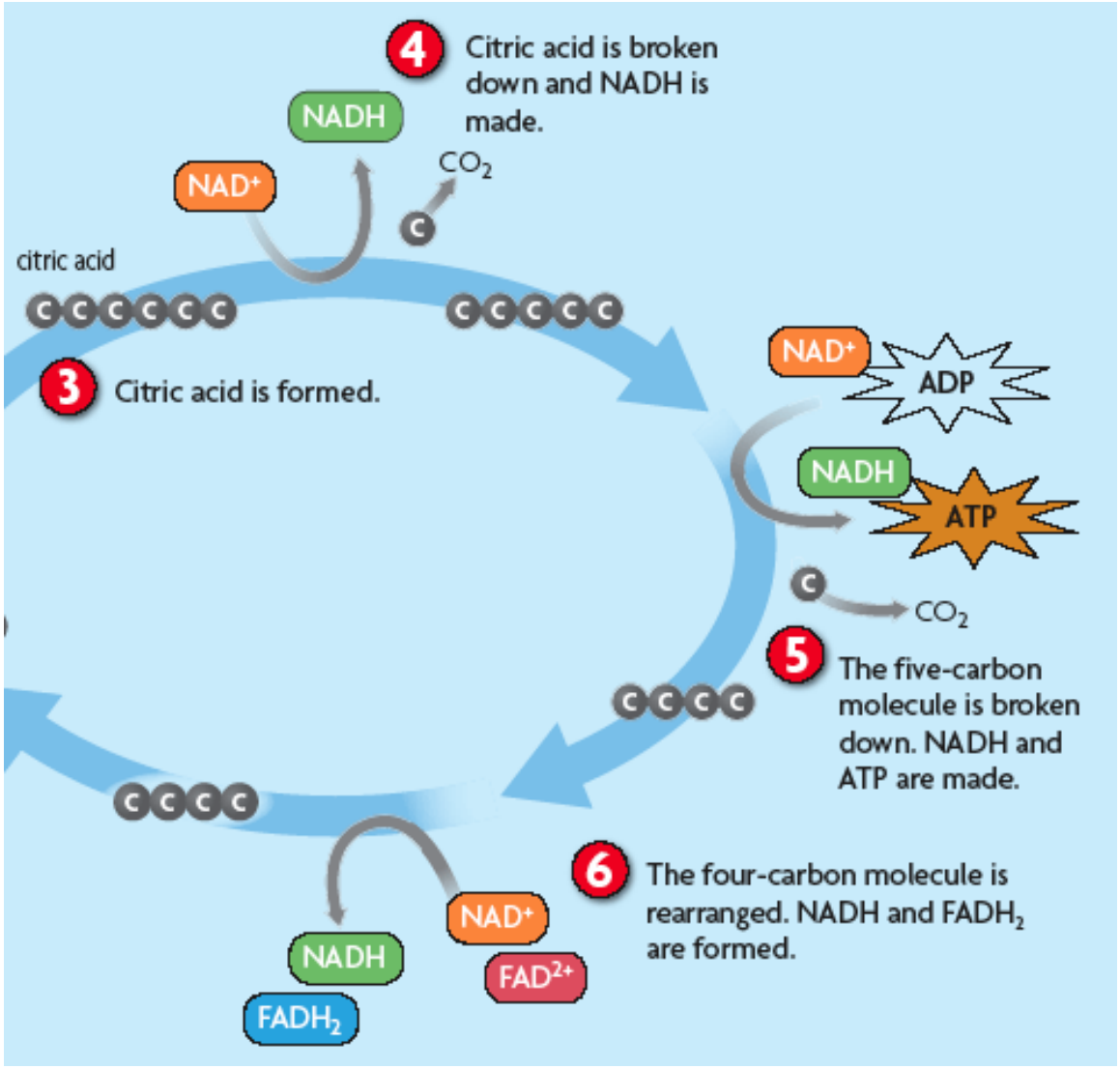
4.5 Cellular Respiration in Detail

- **The Krebs cycle is the first main part of cellular respiration.**
  - Pyruvate is broken down before the Krebs cycle.
    - carbon dioxide released
    - NADH produced
    - coenzyme A (CoA) bonds to two-carbon molecule



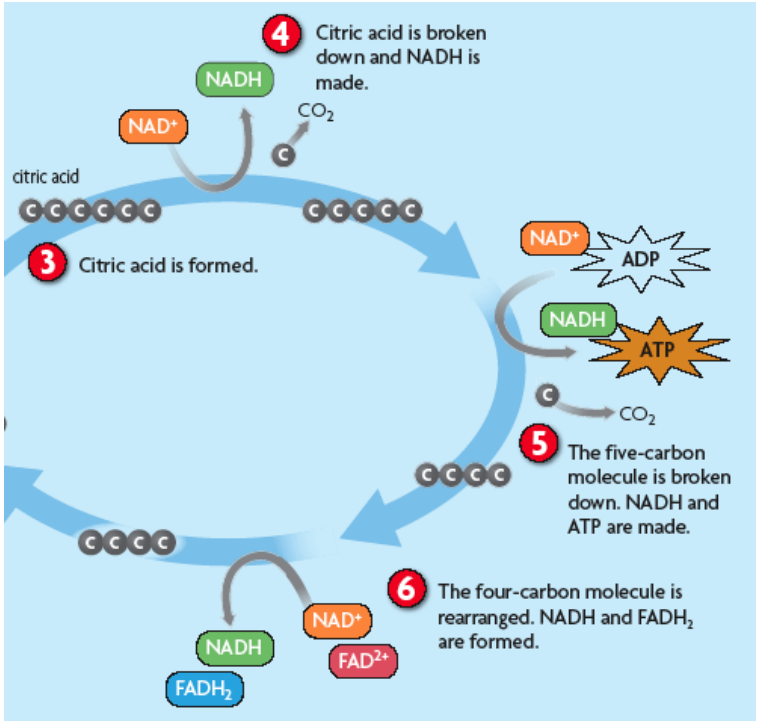
4.5 Cellular Respiration in Detail

- The Krebs cycle produces energy-carrying molecules.



4.5 Cellular Respiration in Detail

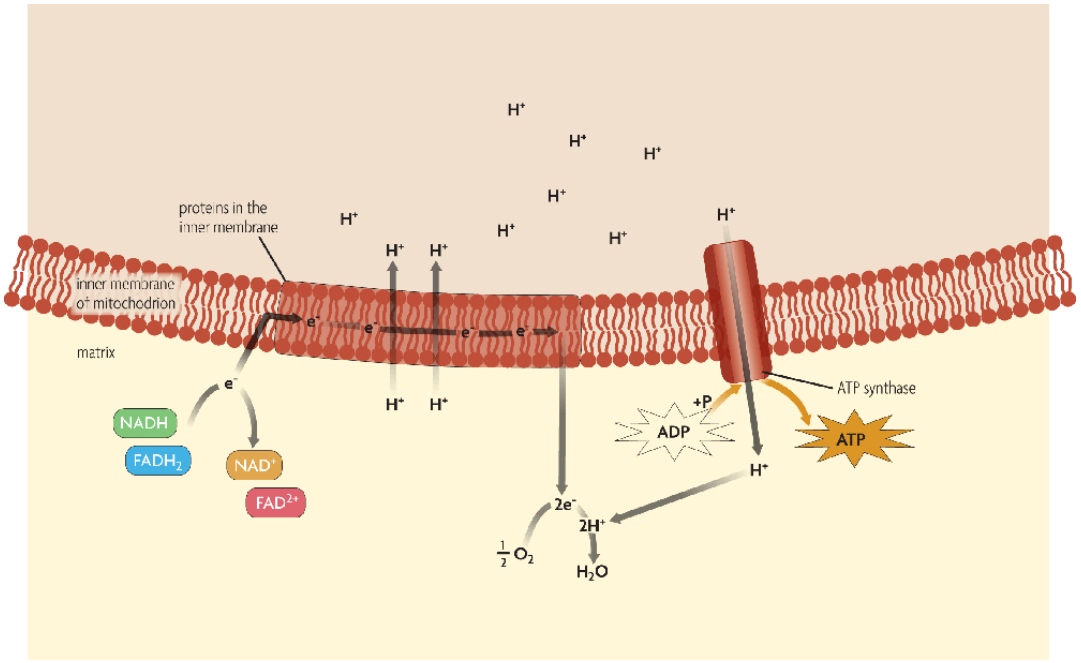
- The Krebs cycle produces energy-carrying molecules.
  - NADH and $FADH_2$ are made
  - intermediate molecule with CoA enters Krebs cycle
  - citric acid (six-carbon molecule) is formed
  - citric acid is broken down, carbon dioxide is released, and NADH is made



  - five-carbon molecule is broken down, carbon dioxide is released, NADH and ATP are made
  - four-carbon molecule is rearranged

4.5 Cellular Respiration in Detail

- **The electron transport chain is the second main part of cellular respiration.**
  - The electron transport chain uses NADH and $FADH_2$ to make ATP.
    - high-energy electrons enter electron transport chain
    - energy is used to transport hydrogen ions across the inner membrane
    - hydrogen ions flow through a channel in the membrane



4.5 Cellular Respiration in Detail

- **The electron transport chain is the second main part of cellular respiration.**
  - The electron transport chain uses NADH and $FADH_2$ to make ATP.
  - The breakdown of one glucose molecule produces up to 38 molecules of ATP.
    - ATP synthase produces ATP
    - oxygen picks up electrons and hydrogen ions
    - water is released as a waste product