18.4: Anaerobic Respiration

Skills to Develop

1. Define anaerobic respiration and state the pathways involved.
2. State in what types or organism anaerobic respiration occurs.

Some prokaryotes are able to carry out anaerobic respiration, respiration in which an inorganic molecule other than oxygen ($O_2$) is the final electron acceptor. For example, some bacteria called sulfate reducers can transfer electrons to sulfate ($SO_4^{2-}$) reducing it to $H_2S$. Other bacteria, called nitrate reducers, can transfer electrons to nitrate ($NO_3^-$) reducing it to nitrite ($NO_2^-$). Other nitrate reducers can reduce nitrate even further to nitrous oxide (NO) or nitrogen gas ($N_2$).

Like aerobic respiration, anaerobic respiration involves glycolysis, a transition reaction, the citric acid cycle, and an electron transport chain. The total energy yield per glucose oxidized is less than with aerobic respiration with a theoretical maximum yield of 36 ATP or less.

Summary

1. Cellular respiration is the process cells use to convert the energy in the chemical bonds of nutrients to ATP energy.
2. Aerobic respiration is an exergonic pathway that requires molecular oxygen ($O_2$).
3. Anaerobic exergonic pathways do not require oxygen and include anaerobic respiration and fermentation.
4. Some prokaryotes are able to carry out anaerobic respiration, respiration in which an inorganic molecule other than oxygen ($O_2$) is the final electron acceptor.
5. Some bacteria called sulfate reducers can transfer electrons to sulfate ($SO_4^{2-}$) reducing it to $H_2S$. Other bacteria,
called nitrate reducers, can transfer electrons to nitrate ($\text{NO}_3^-$) reducing it to nitrite ($\text{NO}_2^-$). Other nitrate reducers can reduce nitrate even further to nitrous oxide (NO) or nitrogen gas ($\text{N}_2$).

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**Contributors**

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