Cellular Respiration - Breaking down sugar in the presence of oxygen (aerobic)

C6H12O6 + 6O2 🡪 6 H2O + 6CO2 + energy

Glucose + diatomic Oxygen 🡪 Water + carbon dioxide + energy (38 ATP)

When the body runs out of sugar for glycolysis, it uses fat as fuel. The fatty acid tails in triacylglyerols are broken off and converted to chemicals that can enter the Krebs cycle.

If there isn’t fat to use as fuel, the cells use proteins. The protein is broken up and part of it is rearranged to enter the Krebs cycle.

Fermentation – breaking down sugar without oxygen (Anaerobic)

a. In yeast, bacteria C6H12O6 🡪 2CO2 + 2CH3-CH2-OH (ethanol)

Glucose 🡪 ethanol + Carbon dioxide + energy

b. In animals, bacteria C6H12O6 🡪 2C3H6O3 (lactic acid)

Glucose 🡪 lactic acid + energy

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Process |  | How many ATP needed?  (Cost) | Location – Where does this process take place? | Reactants – What molecules go into this process? | Product – What molecules come out of this process? | How many ATP made? | Net Result of ATP |
| Cellular Respiration (Aerobic – When Oxygen is present) | | | | | | | |
| Equation:  C6H12O6 + 6O2 🡪 6H2O + 6CO2 + energy |  | 2 | In cytoplasm of cell & in mitochondrian | Glucose  C6H12O6  Oxygen  O2 | Water  H2O  Carbon dioxide  CO2 | 38 | 36 |
|  | Glycolysis | 2 | Cytoplasm | Glucose | 2 Pyruvic acid | 4 | 2 |
|  | Krebs Cycle |  | Mitochondrian matrix (the inner compartment) | Pyruvic acid | Water H2O  Carbon dioxide CO2 | 2 | 2 |
|  | Electron Transport Chain |  | Mitochondrian christae (inner membrane) | Hydrogen  H2 | 32 | 32 |  |
| Fermentation (Anaerobic – When there isn’t Oxygen around) | | | | | | | |
| Equation:  C6H12O6 🡪 2C3H6O3 (lactic acid) | In animals | 2 | Cytoplasm of the cell | Glucose  C6H12O6 | Lactic acid  C3H6O3 | 4 | 2 |
| Equation:  C6H12O6 🡪 2 CO2 + 2CH3-CH2-OH (ethanol) | In yeast | 2 | Cytoplasm of the cell | Glucose  C6H12O6 | Ethanol  2CH3-CH2-OH  &  Carbon dioxide CO2 | 4 | 2 |

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