

2.8 Cell Respiration

ATP Production

Define cell respiration

Cell respiration is the controlled release of energy from organic compounds to produce ATP

Describe how ATP acts as the energy currency for the cell

ATP is composed of a sugar and base (adenosine) connected to three phosphate groups

When a phosphate is cleaved (to form ADP + Pi), the energy stored in the bond is released

Compare anaerobic and aerobic respiration

	Anaerobic	Aerobic
Required Conditions	Oxygen not required	Oxygen required
Energy Yield	Small yield (~2 ATP)	High yield (~36 - 38 ATP)
Products	Animals: Lactic acid Plants: Ethanol and carbon dioxide	Carbon dioxide and water
Location	Cytosol	Cytosol and mitochondria

Outline the purpose (and products) of fermentation

The purpose of fermentation is to restore stocks of NAD⁺ needed for glycolysis (anaerobic respiration)

This allows ATP to continue to be produced in the absence of oxygen (otherwise respiration would stop)

Fermentation in animals reversibly converts pyruvate to lactic acid (and frees up NAD⁺)

Fermentation in plants reversibly converts pyruvate to ethanol and carbon dioxide (and frees up NAD⁺)

Describe the use of respirometry in measuring respiration rates

Respirometers measure respiration rate - either by amount of carbon dioxide produced or oxygen consumed

• A manometer can accomplish this by recording the pressure change (as a moving bubble in solution) that occurs when oxygen is consumed (must include a carbon dioxide absorbant)