Photosynthesis Cheat Sheet

by stevenm746 via cheatography.com/67580/cs/16999/

Photosynthesis equation

$6CO_2+12H_2O+\text{Light Energy}\rightarrow C_6H_{12}O_6+6O_2+6H_2O$

Process That Feeds The Biosphere

Photosynthesis-process that converts solar energy into chemical energy

Autotroph-sustain themselves without eating anything from other organisms

Photoautotroph-obtain their organic material from other organisms

Converting light energy to chemical energy of food

Chloroplasts-the sites of PS in plants

Leaves-major locations of PS

Chlorophyll-green pigment within chloroplasts

Stomata-microscopic pores CO_2 enters and O_2 exits through the leaf

Mesophyll-interior tissue of leaf

Thylakoids-connected sacs in the chloroplast

Stroma-a dense fluid chloroplasts contain

Photosynthetic Pigments

Absorption spectrum-graph plotting a pigment's light absorption versus wavelength

Action spectrum-profiles the relative effectiveness of different wavelengths of radiation in driving a process

Chlorophyll A-main photosynthetic pigment

Chlorophyll B-accessory pigments that broadens the spectrum used for PS

Carotenoids-accessory pigments that absorb excess light that would damage chlorophyll

The Splitting Of Water

Chloroplasts split H_2O into hydrogen and oxygen, incorporating the electrons of hydrogen into sugar molecules

Photosynthesis as a redox process

H_2O is oxidized and CO_2 is reduced

The light reactions (in the thylakoids)

Split H_2O
Release O_2
Reduce $NADP^+$ to NADPH
Generate ATP from ADP by Phosphorylation

Calvin Cycle (in the stroma)

Forms sugar from CO_2, using ATP and NADPH
Begins with carbon fixation, incorporating CO_2 into organic molecules

Light to Chemical Energy

Thylakoids transform light energy into chemical energy using ATP and NADPH

Linear electron flow

Linear electron flow-primary pathway, involves both photosystems and produces ATP and NADPH using light energy

A Photosystem

Photosystem- reaction-center complex surrounded by light harvesting complexes

Primary electron acceptor-reaction center accepts an electron from chlorophyll A

Photosystem II (functions first)-best at absorbing wavelength of 680 nm

Photosystem I (functions second)-best at absorbing wavelength of 700 nm

C3 Plants

Most common and the most efficient at photosynthesis in cool, wet climates

C4 Plants

Minimize photorespiration by incorporating CO_2 into 4 carbon compounds in mesophyll cells

Requires PEP carboxylase (has a higher affinity for CO_2 than O_2)

CAM Plants

Open stomata at night, incorporating CO_2 into organic acids and used in the calvin cycle

Importance of Photosynthesis

Energy entering chloroplasts as sunlight gets stored as chemical energy in organic compounds

Plants store excess sugar as starch in structures such as roots, tubers, seeds, fruits

Produces O_2 in our atmosphere

Importance of Photosynthesis

Energy entering chloroplasts as sunlight gets stored as chemical energy in organic compounds

Cyclic Electron Flow

Uses only PS 1 and produces ATP but not NADPH

Generates surplus ATP, satisfying higher demand for calvin cycle

May protect cells from light induced damage

The Nature of Sunlight

Light is a form of electromagnetic energy that travels in rhythmic waves

Wavelength-distance between crests of waves

Wavelength determines the type of electromagnetic energy

Electromagnetic Spectrum- entire range of electromagnetic energy or radiation

Visible light-wavelengths that produce colors we can see

Photons- discrete particles light consists of

By **stevenm746**
cheatography.com/stevenm746/

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