SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Subject Code: 19BY701

Subject: Biology for Engineers

Unit-II

Topic: Photosynthesis

THE BASICS OF PHOTOSYNTHESIS

- Almost all plants are photosynthetic autotrophs, as are some bacteria and protists
  - Autotrophs generate their own organic matter through photosynthesis
  - Sunlight energy is transformed to energy stored in the form of chemical bonds

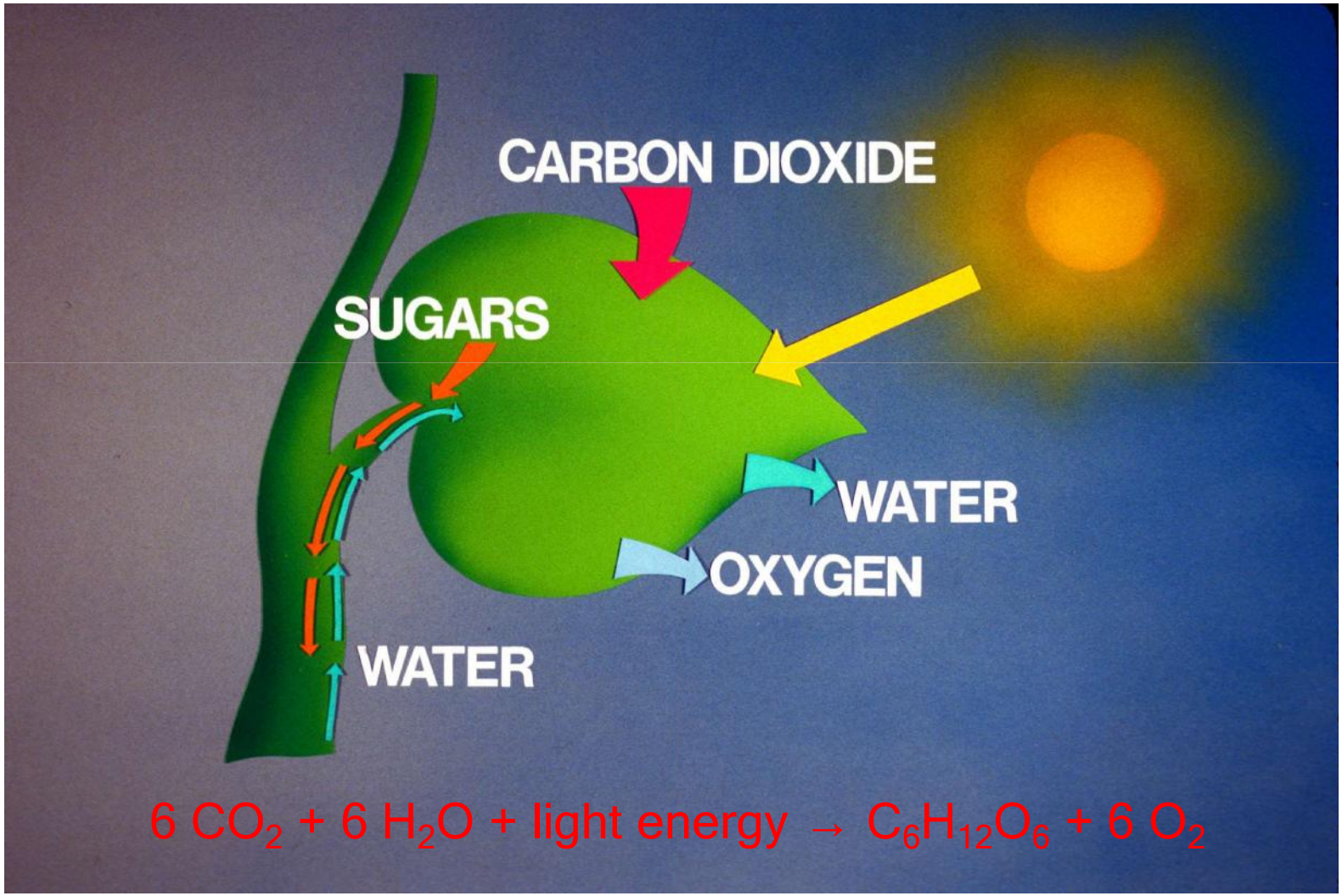
(a) Mosses, ferns, and

(b) Kelp

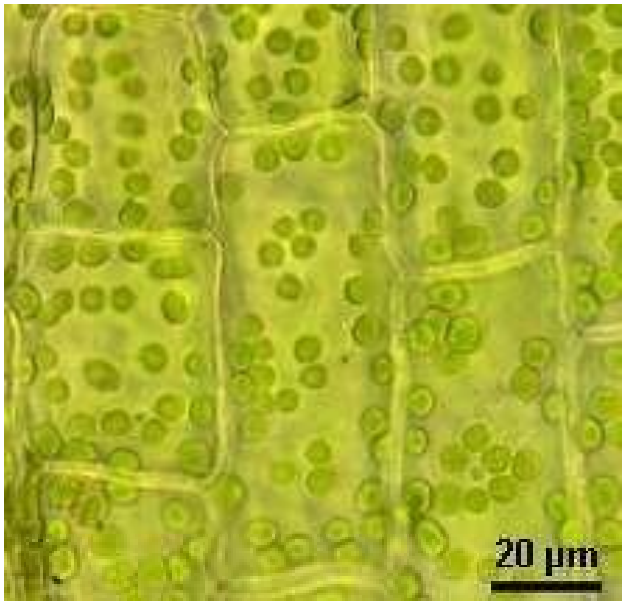
(c) *Euglena*

(d) Cyanobacteria

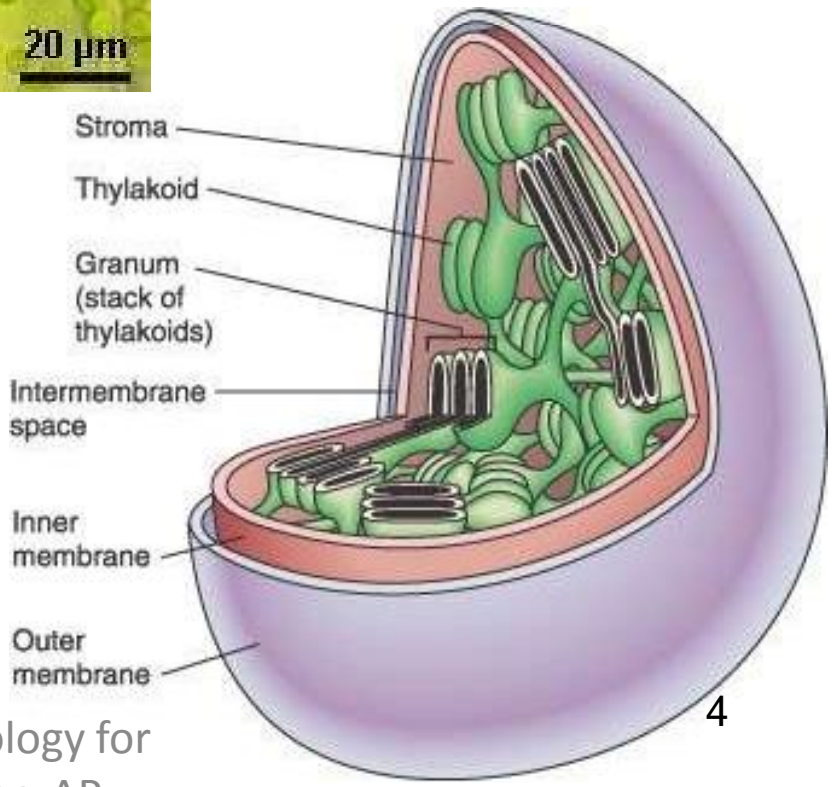
Light Energy Harvested by Plants & Other Photosynthetic Autotrophs



WHY ARE PLANTS GREEN?

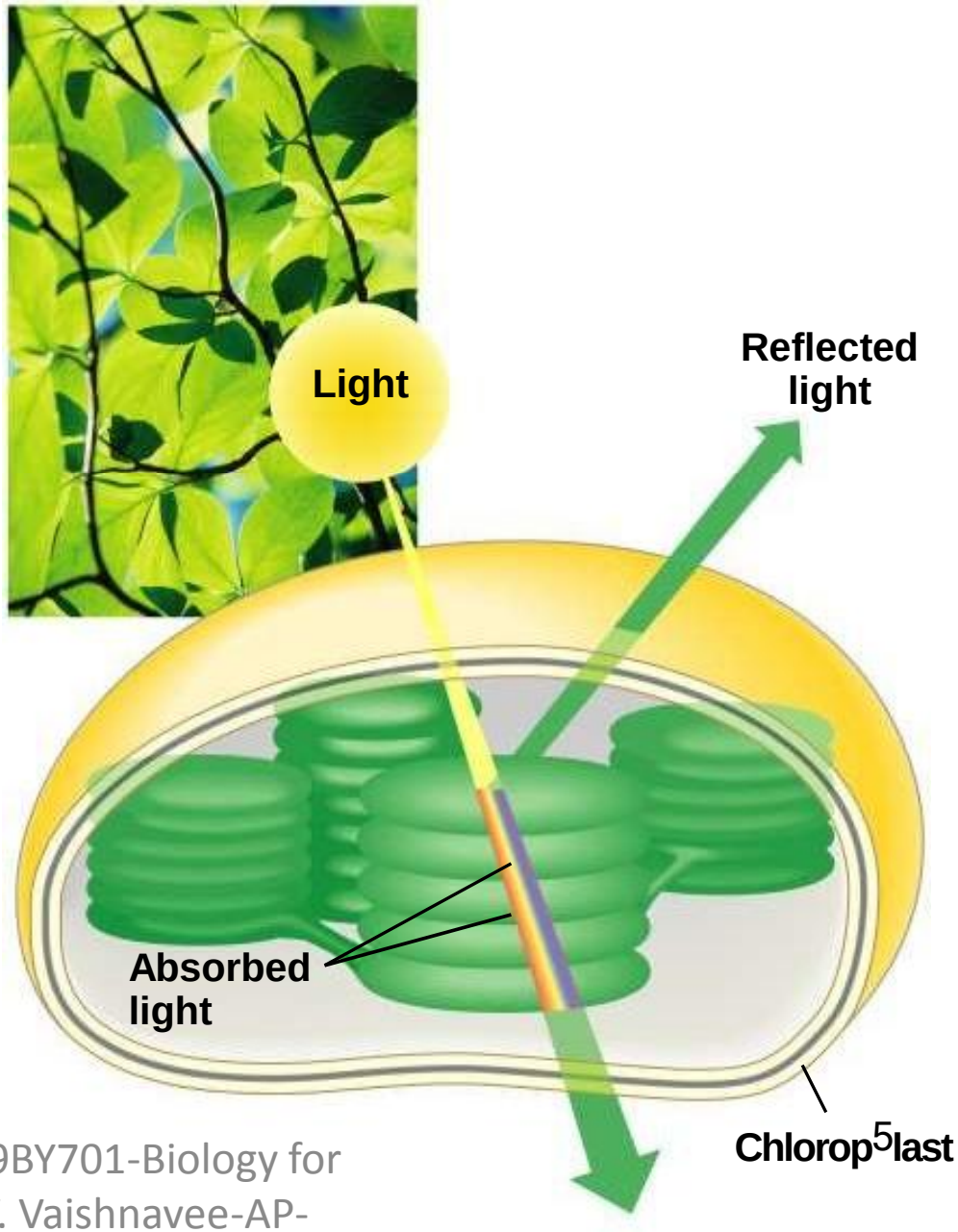


Plant Cells have Green Chloroplasts



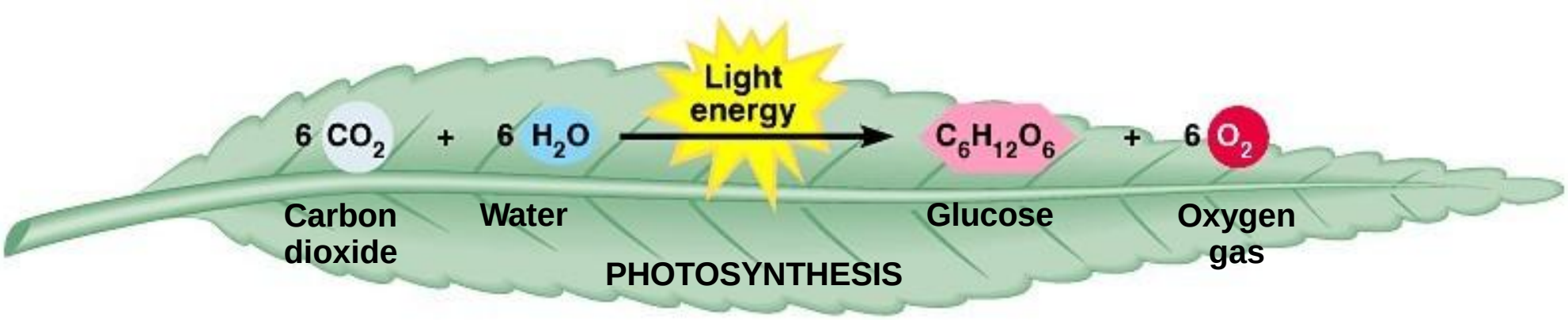
THE COLOR OF LIGHT SEEN IS THE COLOR NOT ABSORBED

- Chloroplasts absorb light energy and convert it to chemical energy



AN OVERVIEW OF PHOTOSYNTHESIS

- Photosynthesis is the process by which autotrophic organisms use light energy to make sugar and oxygen gas from carbon dioxide and water



PHOTOSYNTHESIS

- Sunlight provides ENERGY

CO_2 + H_2O produces
Glucose + Oxygen

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

Steps of Photosynthesis

- Light hits reaction centers of chlorophyll, found in chloroplasts
- Chlorophyll vibrates and causes water to break apart.
- Oxygen is released into air
- Hydrogen remains in chloroplast attached to NADPH
- “THE LIGHT REACTION”

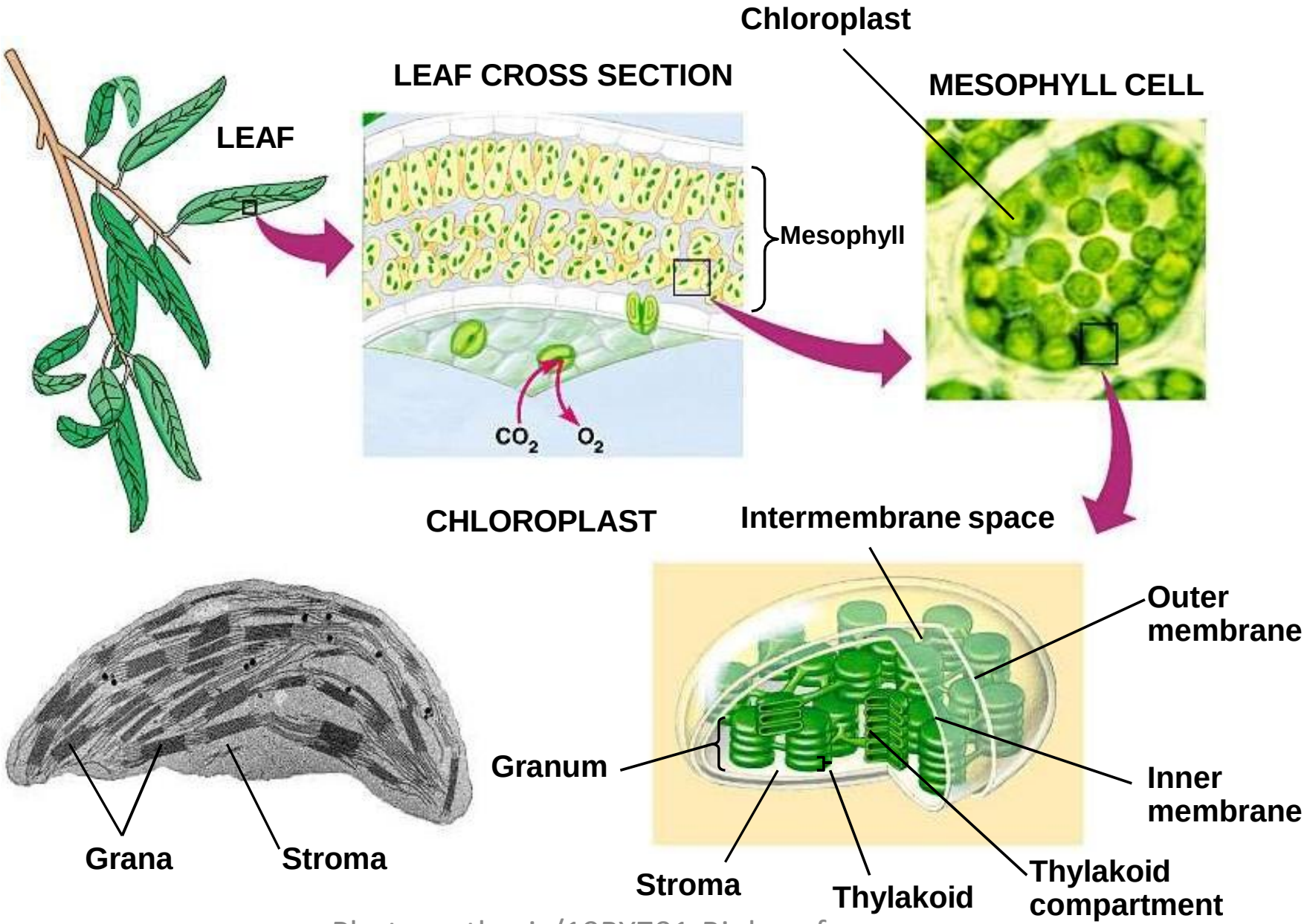
Steps of Photosynthesis

- The DARK Reactions= Calvin Cycle
- CO_2 from atmosphere is joined to H from water molecules (NADPH) to form glucose
- Glucose can be converted into other molecules with yummy flavors!

Photosynthesis occurs in chloroplasts

- In most plants, photosynthesis occurs primarily in the leaves, in the chloroplasts
- A chloroplast contains:
  - stroma, a fluid
  - grana, stacks of thylakoids
- The thylakoids contain chlorophyll
  - Chlorophyll is the green pigment that captures light for photosynthesis

- The location and structure of chloroplasts



Chloroplast Pigments

- Chloroplasts contain several pigments
  - Chlorophyll a
  - Chlorophyll b
  - Carotenoids
  - Xanthophyll

Figure 7.7

Summary—Light Dependent Reactions

a. Overall input

light energy, H_2O.

b. Overall output

ATP, NADPH, O_2.

Summary—Light Independent Reactions

a. Overall input

CO_2, ATP, NADPH.

b. Overall output

glucose.

Review: Photosynthesis uses light energy to make food molecules

- A summary of the chemical processes of photosynthesis