

LEARNING OUTCOMES

At the end of this topic you should be able to:

- define the term *photosynthesis*
- state the source of energy, the raw materials and the products of photosynthesis
- write word and balanced chemical equations for photosynthesis
- state the role of chlorophyll in photosynthesis
- describe the fate of the products of photosynthesis.

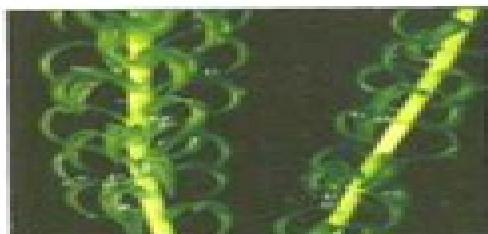


Figure 4.2.1

In bright sunshine the freshwater plant, *Elodea*, releases bubbles of gas rich in oxygen.

STUDY FOCUS

You should learn these two equations, but realise they summarise many reactions that occur within chloroplasts. In one of these reactions carbon dioxide gains electrons. These come from the splitting of water. A reaction where a substance gains electrons is called a *reduction reaction*.

Water weeds oxygenate the water in fish tanks, ponds, lakes and rivers. During daylight hours they release bubbles of gas that are rich in oxygen – the waste product of photosynthesis (Figure 4.2.1).

Photosynthesis is a process that uses light energy to drive chemical reactions in which carbon dioxide and water are changed to glucose and oxygen.

Light is absorbed by **chlorophyll**, a green pigment which is found only in chloroplasts.

The process is summarised in this word equation:



The chemical equation for photosynthesis is:



In the process of photosynthesis, carbon dioxide and water diffuse into chloroplasts. Chlorophyll absorbs light to split water to form hydrogen ions, electrons and oxygen. These ions and electrons are used to reduce carbon dioxide to a simple sugar.

The simple sugar produced in photosynthesis is used to produce a wide range of substances for the plant. Some is respired immediately by cells as it provides the energy needed to keep the cells alive.

The fate of glucose

The plants use the glucose they produce to make:

- **sucrose** – this is transported around the plant in the phloem. It is used in nectar and fleshy fruits to attract animals for pollination and seed dispersal (see 6.8, 9.5 and 9.6)
- **starch** in storage organs, such as seeds, swollen roots (e.g. yams), swollen stems (e.g. Irish potatoes), as a long-term energy store
- **starch** in leaves to store energy for use in respiration at night
- **cellulose** to make cell walls, also used to make fibres in cotton bolls to help seeds disperse in the wind
- **lipids** to make cell membranes and for energy storage, e.g. in seeds.

By combining sugars with nitrogen from nitrate ions, plants can make amino acids and then use them to make proteins, such as enzymes (see 5.3) and carrier proteins in cell membranes (see 3.4).

Photosynthesis Study Guide Campbell

J. E. Mejia



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Essential Biology Neil A. Campbell,Jane B. Reece,Eric Jeffrey Simon,2007 Essential Biology is a brief non majors biology book that combines clear writing real world applications vivid art and powerful media to teach readers the important concepts of biology and give them an appreciation for how biology relates to their everyday lives In the Second Edition best

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K.E. Cooksey,2012-12-06 Marine biological science is now studied at the molecular level and although research scientists depend on information gained using molecular techniques there is no book explaining the philosophy of this approach Molecular Approaches to the Study of the Ocean introduces the reasons why molecular technology is such a powerful tool in the study of the oceans describing the types of techniques that can be used why they are useful and gives examples of their application Molecular biological techniques allow phylogenetic relationships to be explored in a manner that no macroscopic method can although the book deals with organisms near the base of the marine food web the ideas can be used in studies of macroorganisms as well as those in freshwater environments **Bible Talk**

J. E. Mejia,2022-02-22 Is there a God that created us or did we all get here by chance as many atheist scientists speculate or theorize If there is a God what is he like and what does that mean for us Is the Bible his inspired and reliable word These may be some questions that the average person asks among others I try to answer these questions throughout the book I examine some evidence for creation I examine prophecies from the book of Daniel and Revelation that prove that God s word is reliable and true I examine some popular doctrines such as whether the Bible supports the doctrine of eternal torment in hell A close inspection shows that it doesn t I also discuss many other important topics Also in the Christian world we are awaiting the return of Jesus Christ He promised he would return and all the promises that God has made he has kept And so I discuss how to get ready for his Second Coming and how to inherit eternal life Anyone no matter their past is welcomed by God And eternal life is a free gift **Biology in Profile**

P. N. Campbell,2013-10-22 Biology in Profile A Guide to the Many Branches of Biology is

a 20 chapter text that describes the profile and biological phenomena of selected branches of biology Each chapter discusses the scope growth areas and specialties of the specific branch of biology This book includes 20 branches of biology such as zoology botany microbiology physiology ecology ethology psychology parasitology pharmacy and pharmacology Other branches covered include toxicology nutrition food science endocrinology immunology genetics virology biophysics biochemistry and molecular biology This book will be of value to students and other scientists who are not practicing biologists

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