

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.

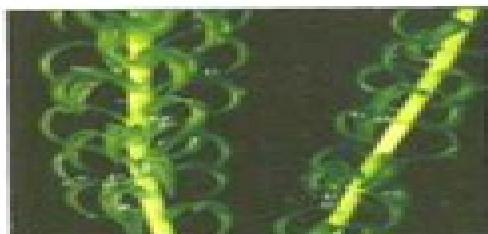


Figure 4.2.1

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

Martha R. Taylor



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Nuclear Science Abstracts ,1974 Biophilic and Bioclimatic Architecture Amjad Almusaed,2010-12-21 Biophilic and Bioclimatic Architecture is a guide to innovative architectural design for architects engineers and other specialists who are working with biophilic and bioclimatic architectural concepts Biophilic and Bioclimatic Architecture has three parts Part I focuses on the relationship between architecture and human needs and the creation process demonstrating the meaning of architectural value in architectural hypothesis Part II opens the way towards a new understanding of biophilic architecture as a response to the negative actions of humans and the negative effects of using natural resources Part III shows the benefits of combining the effects of the climate with the notion of human comfort in bioclimatic architecture **Progress in Photosynthesis Research** J. Biggins,2013-11-21 These Proceedings comprise the majority of the scientific contributions that were presented at the VIIth International Congress on Photosynthesis The Congress was held August 10 15 1986 in Providence Rhode Island USA on the campus of Brown University and was the first in the series to be held on the North American continent Despite the greater average travel distances involved the Congress was attended by over 1000 active participants of whom 25% were registered students This was gratifying and indicated that photosynthesis will be well served by excellent young scientists in the future As was the case for the VIth International Congress held in Brussels articles for these Proceedings were delivered camera ready to expedite rapid publication In editing the volumes it was interesting to reflect on the impact that the recent advances in structure and molecular biology had in this Congress It is clear that

cognizance of structure and molecular genetics will be even more necessary in the design of experiments and the direction of future research **Campbell Biology Australian and New Zealand Edition** Jane B. Reece, Noel Meyers, Lisa A.

Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, 2015-05-20 Over nine successful editions CAMPBELL BIOLOGY has been recognised as the world's leading introductory biology textbook The Australian edition of CAMPBELL BIOLOGY continues to engage students with its dynamic coverage of the essential elements of this critical discipline It is the only biology text and media product that helps students to make connections across different core topics in biology between text and visuals between global and Australian New Zealand biology and from scientific study to the real world The Tenth Edition of Australian CAMPBELL BIOLOGY helps launch students to success in biology through its clear and engaging narrative superior pedagogy and innovative use of art and photos to promote student learning It continues to engage students with its dynamic coverage of the essential elements of this critical discipline This Tenth Edition with an increased focus on evolution ensures students receive the most up to date accurate and relevant information Readers' Guide to Periodical Literature, 1915 *Biology* M. B. V. Roberts, T. J. King, 1987 NO description available **Readers' Guide to**

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Molecular Biology of the Cell, 1996 MBC online publishes papers that describe and interpret results of original research concerning the molecular aspects of cell structure and function

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