Chemistry-101

الكيمياء-101

تحضيري-JU

شرح مع أسئلة الإختبارات

Ch-6.3

ملخصات يوسف زويل

تواصل مستمر مع أستاذ المادة لأي استفسار على الواتس 00966502047005

Chapter 6

6.3.1 How do cells extract energy in chemical bonds in organic molecules

Sources for ATP generation

Although glucose is considered to be the primary source of sugar for respiration and fermentation, there are actually three sources of molecules for generation of ATP

–Carbohydrates (disaccharides)

–Proteins (after conversion to amino acids)

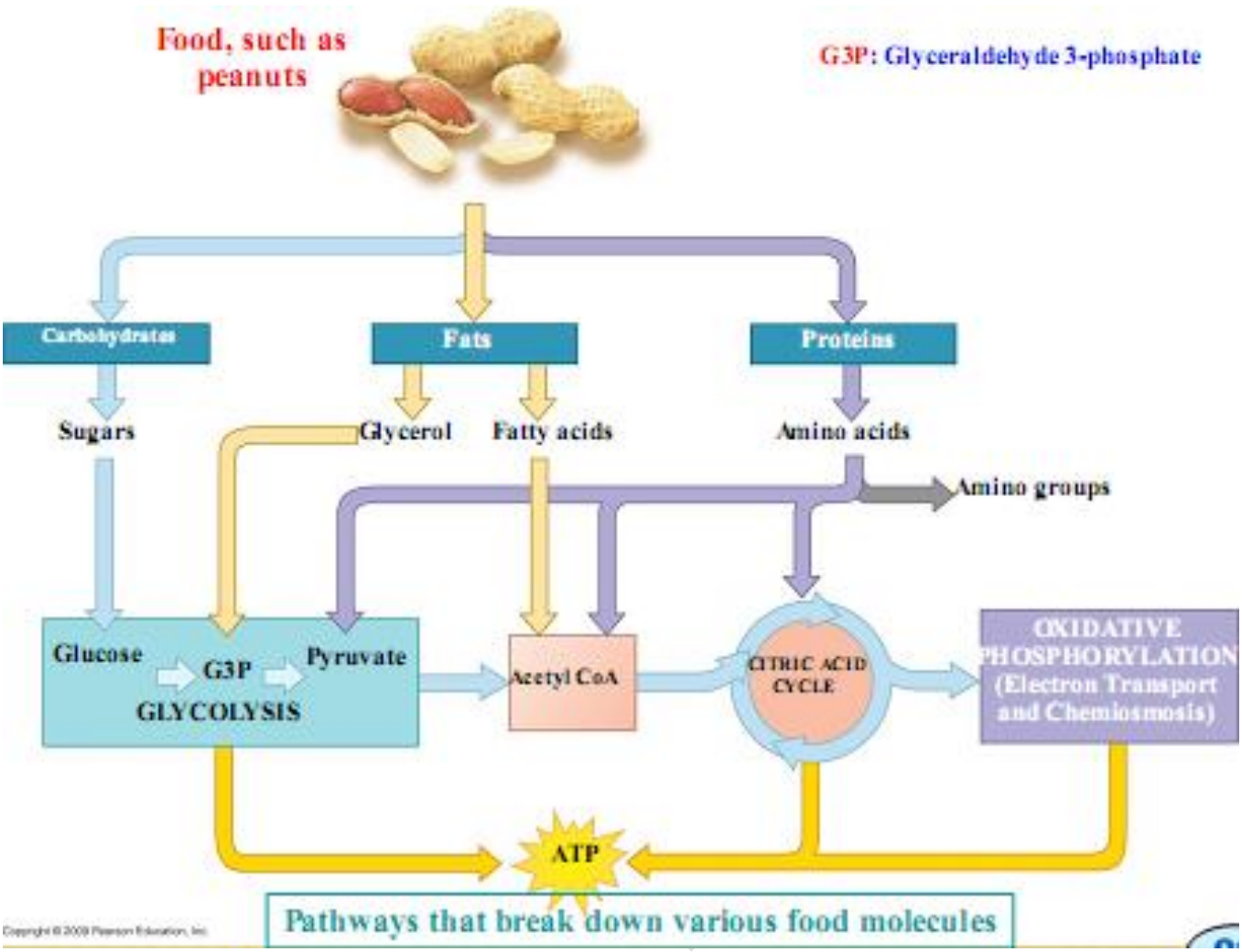
–Fats

Catabolism of Various Food Molecules

Other organic molecules used for fuel.

Fats: glycerols and fatty acids both oxidized as fuel.

Proteins: amino acids undergo deamination. Carbon skeletons converted to intermediates of aerobic respiration.



1. (سؤال من اختبار سابق) Amino acids undergo _____ before used as fuel

- deamination
- amination
- hydrogenation
- First and second choice

2. (سؤال من اختبار سابق) Fats undergo hydrolysis to _____ before used as fuel

- glycerol and fatty acids
- fatty acids alone
- glycerol and amino acids
- First and second choice

Photosynthesis : using light to make food

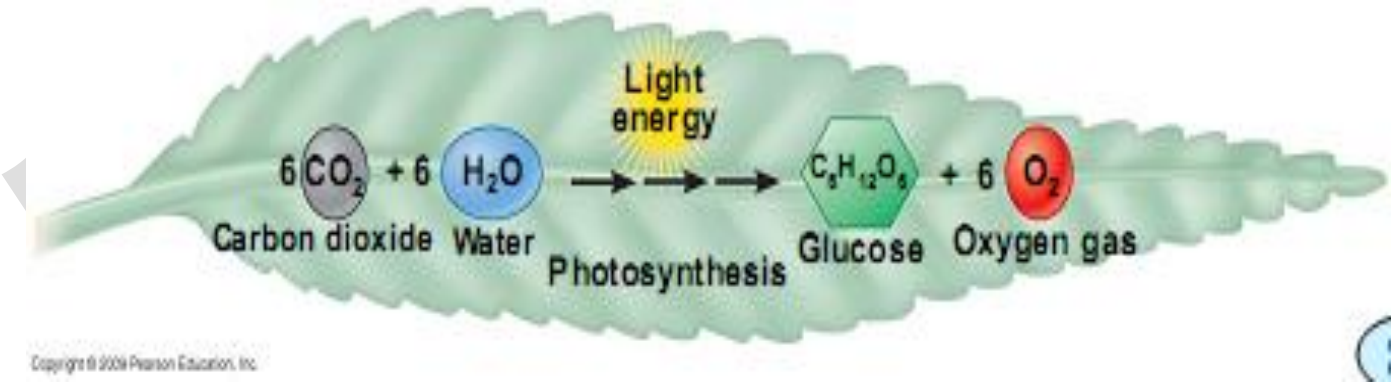
Plants use water and atmospheric carbon dioxide to produce a simple sugar and liberate oxygen.

– Earth's plants produce 160 billion metric tons of sugar each year through photosynthesis, a process that converts solar energy to chemical energy.

– Sugar is food for humans and for animals that we consume .

photosynthesis

A process that converts solar energy to chemical energy.



3. (سؤال من اختبار سابق) During photosynthesis _____

- oxygen is released
- oxygen is consumed
- carbon dioxide is released
- all of the above

4. (سؤال من اختبار سابق) During photosynthesis _____

- glucose is produced
- carbon dioxide is released
- protein is produced
- none of the above

5. (سؤال من اختبار سابق) Plant cells harvest energy from the sun by a process called ___

- photosynthesis
- inspiration
- expiration
- First and second choice

photosynthesis

- ✓ Photosynthesis occurs in chloroplasts located in mesophyll cells inside the leaf.
- ✓ Light energy is converted to chemical energy (carbohydrates)
- ✓ Hydrogens from water reduce carbon .
- ✓ Oxygen from water is oxidized, forming molecular oxygen.

6. (سؤال من اختبار سابق) During Photosynthesis, _____

- oxygen is released
- Light energy is converted to chemical energy
- Hydrogens from water reduced carob dioxide
- all of the above

7. (سؤال من اختبار سابق) During Photosynthesis, _____

- Light energy is converted to chemical energy
- oxygen is consumed
- carob dioxide is oxidized
- all of the above

Photosynthesis occurs in chloroplasts in plant cells

Chloroplasts are the major sites of photosynthesis in green plants

– Chlorophyll, an important light absorbing pigment in chloroplasts, is responsible for the green color of plants.

– Chlorophyll plays a central role in converting solar energy to chemical energy.

8. (سؤال من اختبار سابق) Pigment that is responsible for converting light energy to chemical energy is _____

- Chlorophyll
- hemoglobin
- greenophyll
- First and second choice

9. (سؤال من اختبار سابق) Chlorophyll in plants _____

- is responsible for converting light energy to chemical energy
- is responsible for converting chemical energy to light energy
- is concentrated in the xylem
- First and second choice

10. (سؤال من اختبار سابق) The Chlorophyll in plants _____

- is responsible for green color of plants
- is concentrated in the xylem
- is concentrated in the phylum
- all of the above

11. (سؤال من اختبار سابق) The Chlorophyll in plants _____

- is concentrated in the epidermis
- is concentrated in the xylem
- is concentrated in the phylum
- none of the above

- ✓ Chloroplasts are concentrated in the cells of the mesophyll, the green tissue in the interior of the leaf.
- ✓ Veins in the leaf deliver water absorbed by roots.

Stomata

are tiny pores in the leaf that allow carbon dioxide to enter and oxygen to exit.

12. (سؤال من اختبار سابق) Stomata are pores in the leaf that allow _____

- carbon dioxide to enter
- oxygen to enter
- Nostrille
- all of the above

13. (سؤال من اختبار سابق) _____ are pores in the leaf that allow carbon dioxide to enter and oxygen to exit

- Stomata
- Stroma
- Nostrille
- all of the above

Chapter 6

6.3.2 Autotrophs are the producers of the biosphere

Autotrophs

- ✓ Are living things that are able to make their own food without using organic molecules derived from any other living thing.

-Autotrophs that use the energy of light to produce organic molecules are called photoautotrophs.

-Most plants, algae and other protists, and some prokaryotes are photoautotrophs.

Kelp, a large algae

1. Plants _____

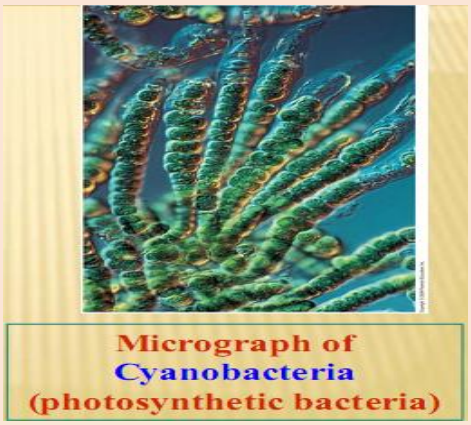
- are photoautotrophs organisms
- are producers
- are hetertrophic organisms
- First and second choice

Note

The ability to photosynthesize is directly related to the structure of chloroplasts.

Chloroplast

Chloroplasts are organelles consisting of photosynthetic pigments, enzymes, and other molecules grouped together in membranes.



Micrograph of Cyanobacteria (photosynthetic bacteria)

Photosynthesis, like respiration, is a redox (oxidation-reduction) process.

– Water molecules are split apart by oxidation, which means that they lose electrons along with hydrogen ions (H^+).

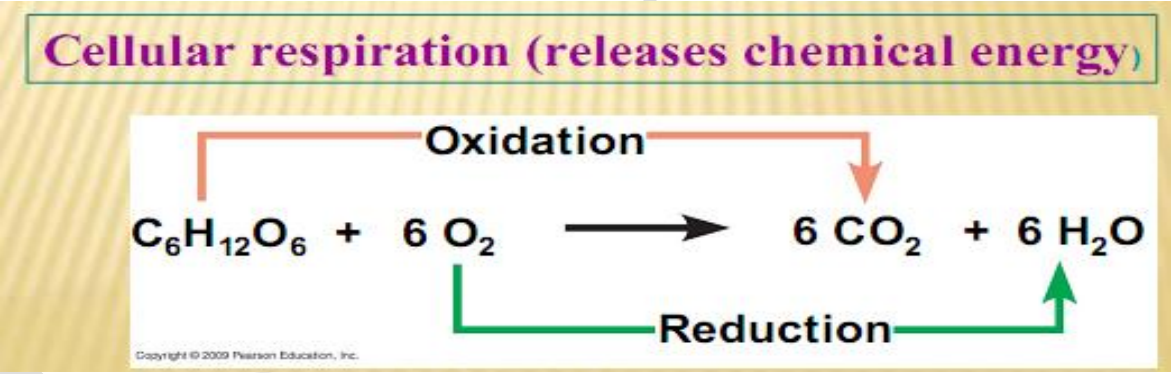
– Then CO_2 is reduced to sugar as electrons and hydrogen ions are added to it.

Cellular respiration

Uses redox reactions to harvest the chemical energy stored in a glucose molecule.

How cellular respiration works

- ✓ This is accomplished by oxidizing the sugar and reducing O_2 to H_2O.
- ✓ The electrons lose potential as they travel down an energy hill, the electron transport system.
- ✓ In contrast, the food-producing redox reactions of photosynthesis reverse the flow and involve an uphill climb.



2. During cellular respiration _____

- carbon dioxide is produced
- oxygen is released
- glucose is produced
- First and second choice

3. During cellular respiration _____

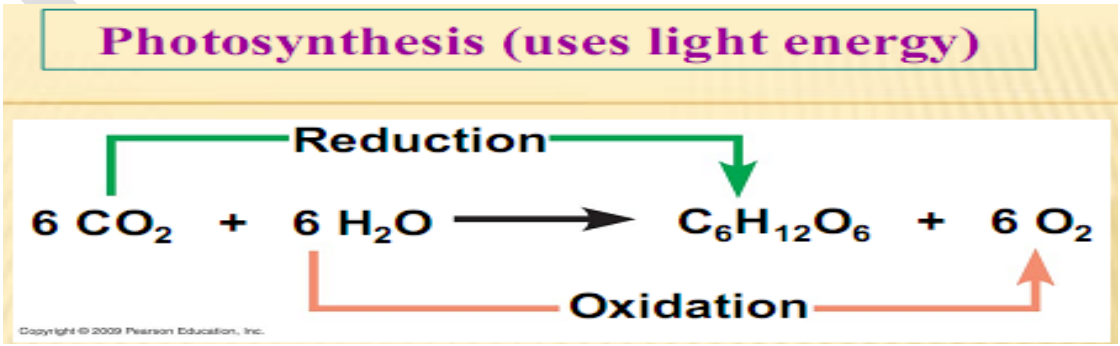
- Glucose loses its hydrogen atoms
- Glucose is oxidized
- Glucose is reduced
- First and second choice

4. During cellular respiration _____

- glucose is used
- carbon dioxide is consumed
- oxygen is released
- glucose is produced

5. During cellular respiration _____

- oxygen gains hydrogen atoms
- Glucose gains hydrogen atoms
- Glucose is reduced
- none of the above



6.During photosynthysis _____

- oxygen is released
- oxygen is consumed
- carbon dioxide is released
- all of the above

Photosynthesis Reactions

1. Light-dependent reactions

light energizes water electrons that generate ATP and NADPH.

2. Carbon fixation reactions

use energy of ATP and NADPH to fix CO_2 into carbohydrate.

Photosynthesis occurs in two metabolic stages

First stage

involves the light reactions

Second stage

is the Calvin cycle

The two stages of photosynthesis are linked by ATP and NADPH

7. Photosynthesis Reactions include _____

- two reactions
- three reactions
- glycolysis reactions
- First and second choice

First stage

- ✓ One stage involves the light reactions, In the light reactions, light energy is converted in the thylakoid membranes to chemical energy and O_2.
- ✓ Thylakoids are concentrated in stacks called **grana**.
- ✓ Water is split to provide the O_2 as well as electrons.

8.Stacks of Thylakoids is called _____

- grana
- granulosa
- ground
- all of the above

9. During photosynthesis light Reactions, _____

- Water is split to provide electrons
- ATP is generated
- NADPH is converted to $NADP^+$
- First and second choice

H^+ ions reduce $NADP^+$ to NADPH, which is an electron carrier similar to NADH.

– NADPH is temporarily stored and then shuttled into the Calvin cycle where it is used to make sugar.

– Finally, the light reactions generate ATP.

10. During photosynthesis light Reactions, _____

- H^+ ions reduce $NADP^+$ to NADPH
- light energy is converted to chemical energy and carob dioxide
- carob dioxide is converted to glucose
- all of the above

11. During photosynthesis light Reactions, _____

- light energy is converted to chemical energy and oxygen
- H^+ ions reduce $NADP^+$ to NADPH
- chemical energy is converted to Light energy
- First and second choice

Second stage

The second stage is the Calvin cycle, which occurs in the stroma of the chloroplast

– It is a cyclic series of reactions that builds sugar molecules from CO_2 and the products of the light reactions

– During the Calvin cycle, CO_2 is incorporated into organic compounds, a process called **carbon fixation.**

12.Photosynthesis Reactions include _____

- Carbon fixation reaction
- citric acid reactions
- cellular respiration reactions
- First and second choice

13. During Calvin cycle, _____

- one CO_2 is incorporated at a time
- two CO_2 are fixed
- two CO_2 are incorporated at a time
- all of the above

14. Stroma ___

- found in the Chloroplast
- contains the Thylakoid
- found in the mitochondria
- First and second choice

15. Stroma ____

- encloses dense fluid
- contains the Granum
- found in the mitochondria
- First and second choice

16. During Calvin cycle, _____

- three CO_2 are fixed
- glycerol leaves the cycle as a product.
- two CO_2 are incorporated at a time
- First and second choice

17. Stroma _____

- has double membranes
- found in the Chloroplast
- contains the Thylakoid
- all of the above

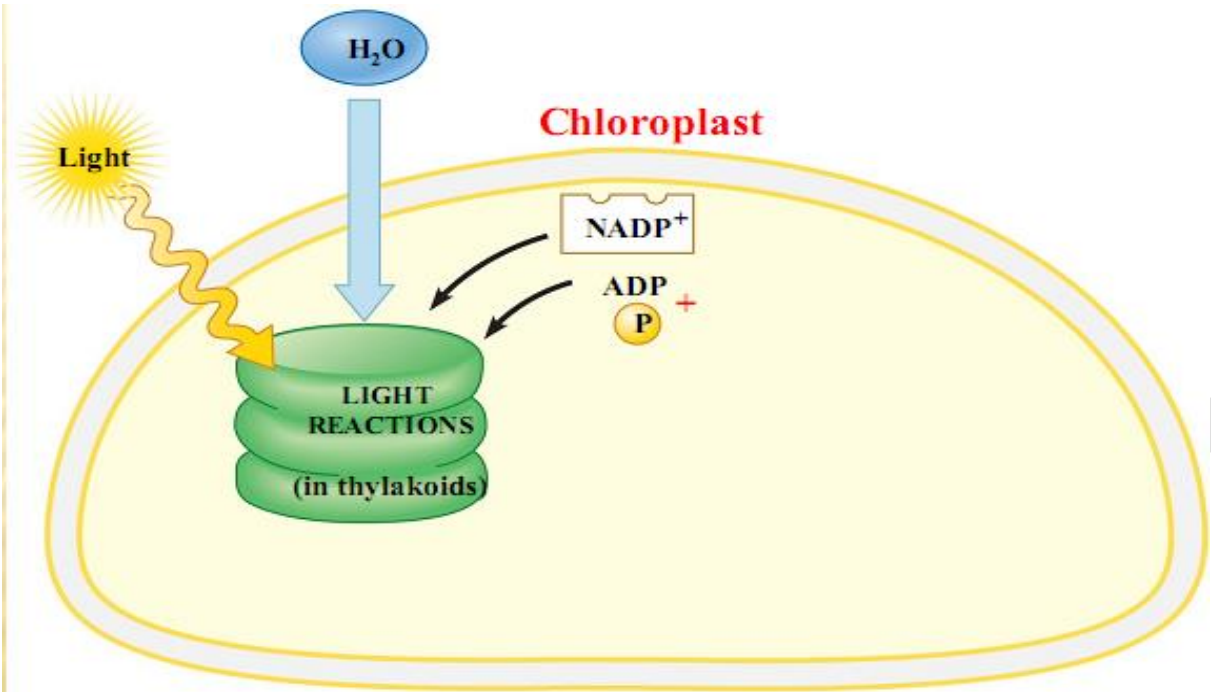
18. Stroma _____

- contains the Thylakoid
- has single membrane
- found in the mitochondria
- all of the above

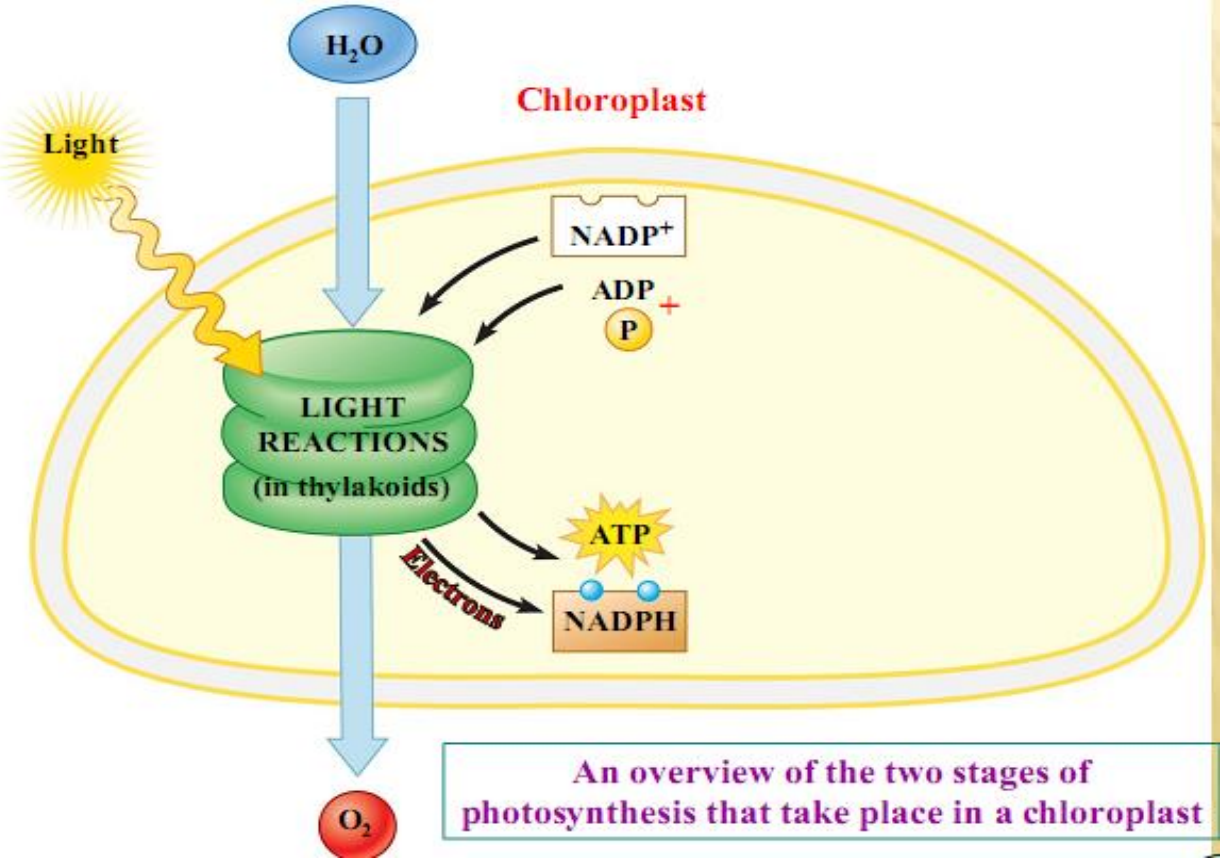
NADPH produced by the light reactions provides the electrons for reducing carbon in the Calvin cycle.

– ATP from the light reactions provides chemical energy for the Calvin cycle.

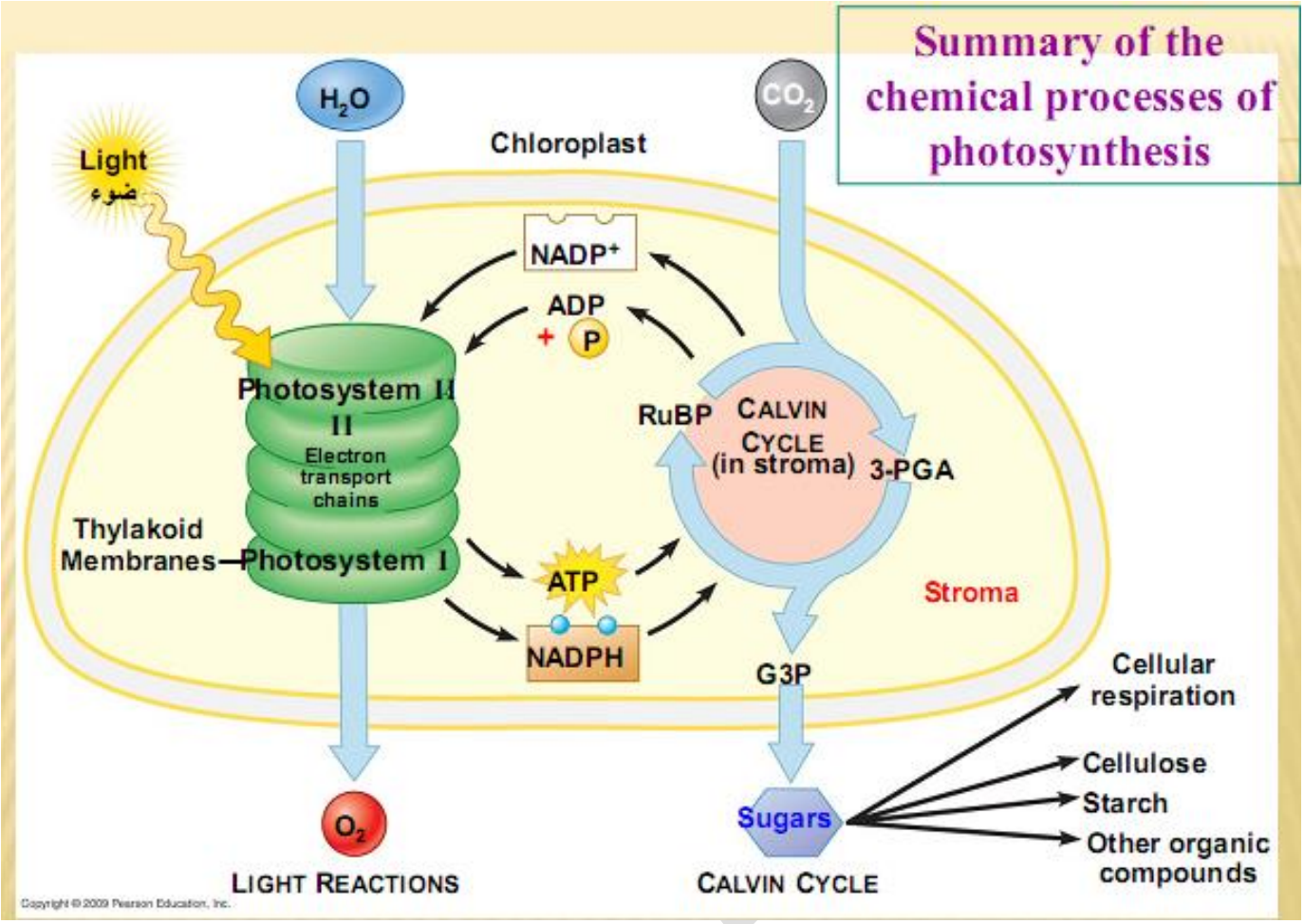
– The Calvin cycle is often called the dark (or light -independent) reactions.



An overview of the two stages of photosynthesis that take place in a chloroplast



An overview of the two stages of photosynthesis that take place in a chloroplast



Calvin cycle

The second stage of photosynthesis. In the stroma, the enzyme rubisco combines CO_2 with RuBP, and ATP and NADPH are used to reduce 3-PGA to G3P. sugar molecules made from G3P serve as a plant's own food supply.

RuBP : a five-carbon sugar called ribulose bisphosphate .

3-PGA : 3-phosphoglyceric acid .

19. During Calvin cycle, _____

- glyceraldehyde 3-phosphate (G3P) leaves the cycle as a product.
- two CO_2 are fixed
- glycerol leaves the cycle as a product.
- all of the above

Photosynthesis uses light energy, CO_2, and H_2O to make food molecules

The chloroplast, which integrates تكامل the two stages of photosynthesis, makes sugar from CO_2.

– All but a few microscopic organisms depend on the food-making machinery of photosynthesis.

– Plants make more food than they actually need and stockpile يتم تخزينه it as starch in roots, tubers, and fruits .

Chapter 6

6.3.3 PHOTOSYNTHESIS, SOLAR RADIATION, AND EARTH'S ATMOSPHERE

CONNECTION: Photosynthesis moderates global warming

- The greenhouse effect results from solar energy warming our planet
- Gases in the atmosphere (often called greenhouse gases), including CO_2, reflect heat back to Earth, keeping the planet warm and supporting life.
- However, as we increase the level of greenhouse gases, Earth's temperature rises above normal, initiating problems.

1) …….results from solar energy warming our planet

a) Photosynthesis
b) Greenhouse effect
c) O_2
d) None of the above

2) The greenhouse effect results from …….energy warming our planet

a) Potential
b) Mechanic
c) Solar
d) Power

3) Gases in the atmosphere (often called greenhouse gases) including ……

a) O_2

b) CO_2

c) PO_4

d) H_2

4) as we increase the level of greenhouse gases, Earth's temperature ……. above normal, initiating problems

a) Decrease

b) Increase

c) Rises

d) b & c

- Increasing concentrations of greenhouse gases lead to global warming, a slow but steady rise in Earth's surface temperature.
- The extraordinary rise in CO_2 is mostly due to the combustion of carbon-based fossil fuels.
- The consequences of continued rise will cause melting of polar ice, changing weather patterns, and spread of tropical disease.
- Perhaps photosynthesis can mitigate the increase in atmospheric CO_2.
- However, there is increasing widespread .
- deforestation, which aggravates the global warming problem.

5) The extraordinary rise in CO_2 is mostly due to the combustion of ……

a) Sulfat -based fossil fuels

b) Carbon -based fossil fuels

c) Hydrogen -based fossil fuels

d) Oxygen -based fossil fuels

6) The consequences of continued rise will cause…….

a) melting of polar ice

b) changing weather patterns

c) spread of tropical disease

d) all of the above

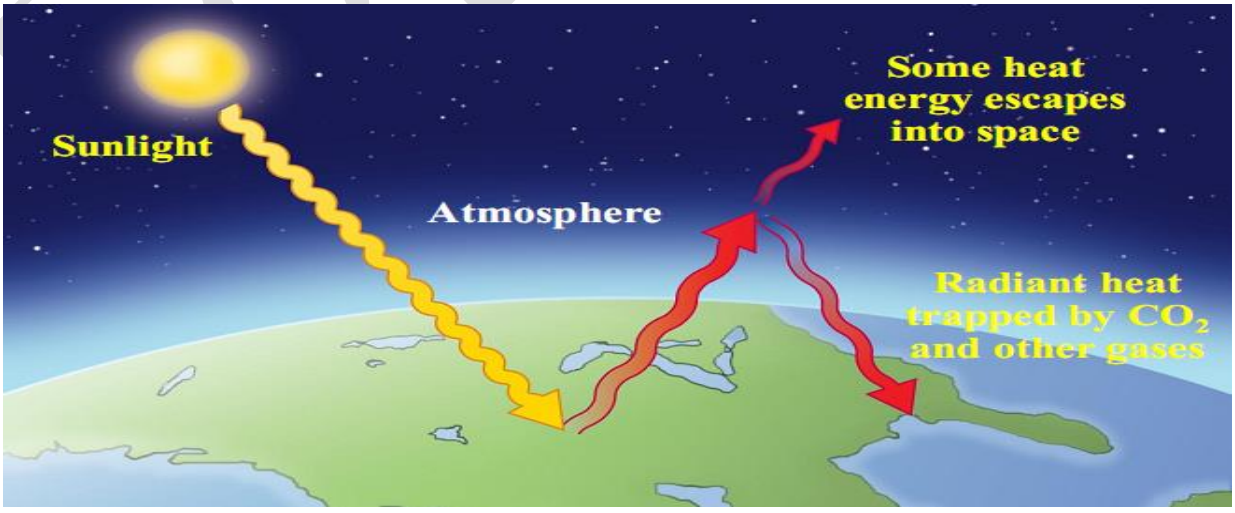
7) …….which aggravates the global warming problem.

a) Photosynthesis

b) deforestation

c) a & b

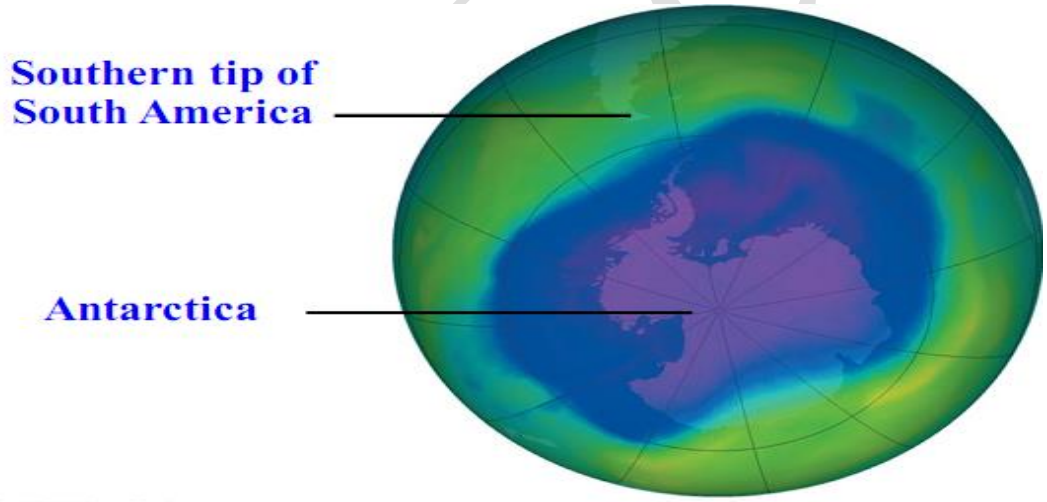
d) None of the above



CO_2 in the atmosphere and global warming

TALKING ABOUT SCIENCE: Mario Molina talks about Earth's protective ozone layer

- Dr. Mario Molina at the University of California, San Diego, received a Nobel Prize for research on damage to the ozone layer .
  - Ozone provides a protective layer (the ozone layer) in our atmosphere to filter out powerful ultraviolet radiation .
  - Dr. Molina showed that industrial chemicals called chlorofluorocarbons (CFCs), deplete the ozone layer.



The ozone hole in the Southern Hemisphere,spring 2006

8)……. provides a protective layer (the ozone layer) in our atmosphere to filter out powerful ultraviolet radiation .

a) CO_2

b) SO_2

c) ozone

d) none of the above

9) Dr. Molina showed that industrial chemicals called ……., deplete the ozone layer.

a) hydrofluorocarbons (CFCs)
b) chlorofluorocarbons (CFCs)
c) Bromofluorocarbons (CFCs)
d) fluorofluorocarbons (CFCs)

10) The chlorofluorocarbons (CFCs),can ……. the ozone layer.

a) Protect
b) Deplete
c) Save
d) a & c