



# Excretion

CH 6 Science | Class 10

Notes + 10 Years Integrated PYQ's





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## b) Aerobic respiration

- In this respiration pyruvate breakdown happens in presence of oxygen to give rise three molecules of carbon dioxide and water.
- Release of energy is much more in this compare to anaerobic respiration.

## 3) Oxygen Transportation

- In human beings, haemoglobin is present in the blood that takes up oxygen from air to lungs.
- Before releasing, it carries the oxygen to oxygen deficient tissues.

## → Carbon dioxide Transportation

- In humans, it is transported from body tissues in dissolved form in our blood plasma to lungs, as carbon dioxide is more soluble in water.
- And here it diffuses from blood to air in lungs.

4) The passage of air gets divided into smaller and smaller tubes, known as bronchi which then form bronchioles.

- Then the formed bronchioles terminate in balloon-like structures, known as alveoli.
- These alveoli present in the lungs provide maximum surface for gases exchange.
- The alveoli contains thin walls and extensive network of blood vessels to facilitate exchange of gases.

# EXCRETION

→ Excretion is a biological process by which an organism gets rid of nitrogenous waste products from the body.

## EXCRETION IN PLANTS

\* Waste Product of a Plant!

→ Oxygen can be looked upon as a waste product of photosynthesis and carbon dioxide a waste product of respiration whereas water is a waste product of both.



## \* How is Water Lost?

- Water will be lost through transpiration.
- Oxygen is a waste product of photosynthesis.
- Carbon dioxide is a waste product of respiration.
- Water is a waste product of transpiration.

## → What are other products of excretion?

◇ Gums  
resins  
rubber

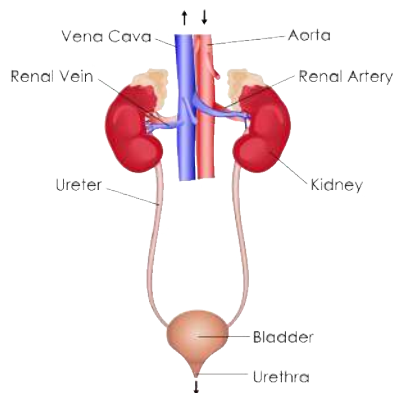
latex are also removed from various parts of the plant body.

## → Organs of Excretion in Humans

◇ Organs of excretion include the following:

- SKIN
- LIVER
- LARGE INTESTINE
- LUNGS
- KIDNEYS

## Excretory system in human beings

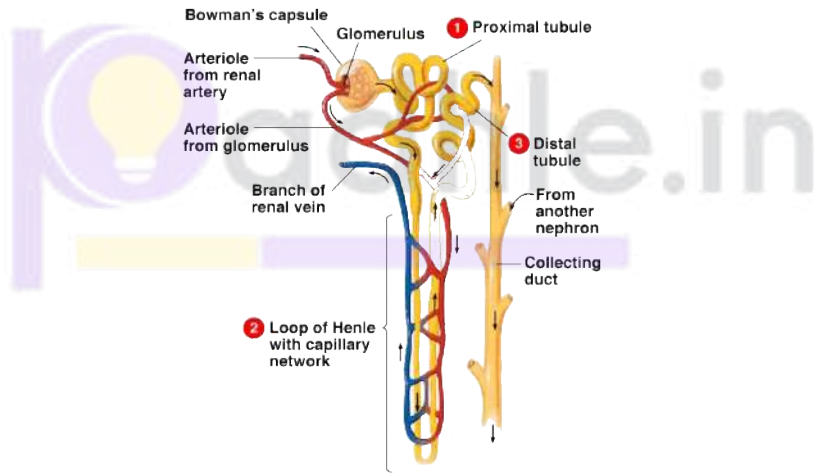


→ Human excretory system consists of a pair of kidneys, a pair of ureters, a urinary bladder and a urethra forms the human excretory system.

- Kidneys are present on either side of the backbone in the abdomen.
- Kidneys produce urine and urine from kidney passes through the ureters into the urinary bladder and remains stored there until it is released through the urethra.

## NEPHRON

◇ Each structural and functional unit of kidney is known as Nephron  
(ये याद करके दिमाग में बिठा ही लेना)



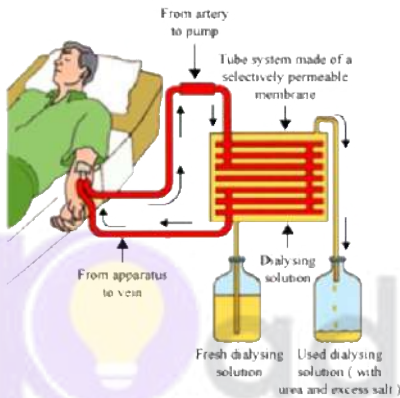
## Ultrafiltration

- ◇ Ultrafiltration begins in the nephron in the kidney.
- Blood travels through a coiled structure of capillaries called the glomerulus surrounded by the Bowman's capsule.

# Selection Reabsorption

- ◇ This absorption takes place selectively allowing substances useful to be reabsorbed excluding those not needed by the body.
- Substances like glucose, amino acids,  $\text{Na}^+$ , etc., in the filtrate are reabsorbed actively.

# Haemodialysis



- In case of kidney failure, accumulation of poisonous wastes takes place in the kidneys, which can be fatal.
- In such cases, haemodialysis is employed.
- It is a method for removing waste products such as potassium and urea, as well as free water from the blood in case of renal failure.
- In this, the patient's blood is pumped through the blood compartment of dialyzer, exposing it to a semipermeable membrane.
- During this passage, the waste products from the blood pass into the dialysing fluid by diffusion.
- The purified blood is then returned via the circuit back to the body.
- Here, ultrafiltration occurs by increasing the hydrostatic pressure across the dialyzer membrane.
- This is done by applying a negative pressure to the dialysate compartment of the dialyzer.
- The pressure gradient causes water and dissolved solutes to move from blood to dialysate, and allows removal of several litres of excess fluid during a typical

- 3 to 5 hour treatment.
- This is similar to the function of kidney, but it is different since there is no reabsorption involved.



# 1 Mark Questions

1. How do autotrophs obtain  $\text{CO}_2$  and  $\text{N}_2$  to make their food? **[1M, 2008]**

Ans1.  $\text{CO}_2$  is obtained from the environment and  $\text{N}_2$  is obtained from the soil and environment.

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2. Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to?

**[1M, 2010]**

Ans 2. The green colour of the leaves of the plant is due to the presence of tiny green coloured organelles called chloroplasts which contain green pigment chlorophyll.

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3. What will happen to a plant if its xylem is removed?

**[1M, 2009]**

Ans 3. Xylem tissue conducts water and minerals from the soil to different parts of the plant. If the xylem tissue is removed, then the transport of water and mineral will not take place and the plant will die.

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4. Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this green colour due to?

**[1M, 2010]**

Ans 4. The green dot-like structures are chloroplasts. This green colour is due to the presence of chlorophyll.

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5. What will happen to a plant if its xylem is removed?

**[1M, Delhi 2009]**

Ans 5. Xylem is the main water conducting tissue of plants. If it is removed then water and minerals absorbed by plant roots will not be able to reach different plant parts and the plant will wilt and ultimately die.

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6. Name the tissue which transports soluble products of photosynthesis in a plant.

[1M, Delhi 2008]

Ans 6. The phloem is a vascular tissue that transports soluble products of photosynthesis (food or sugar) to all the parts of plants.

## 2 Mark Questions

7. Write one function each of the following components of the transport system in human beings:

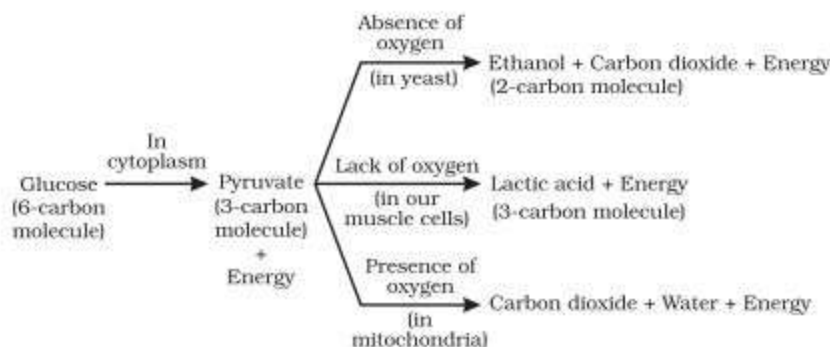
(a) Blood vessels

(b) Blood platelets

(c) Lymph

(d) Heart

[2M, 2008]



Ans 7.

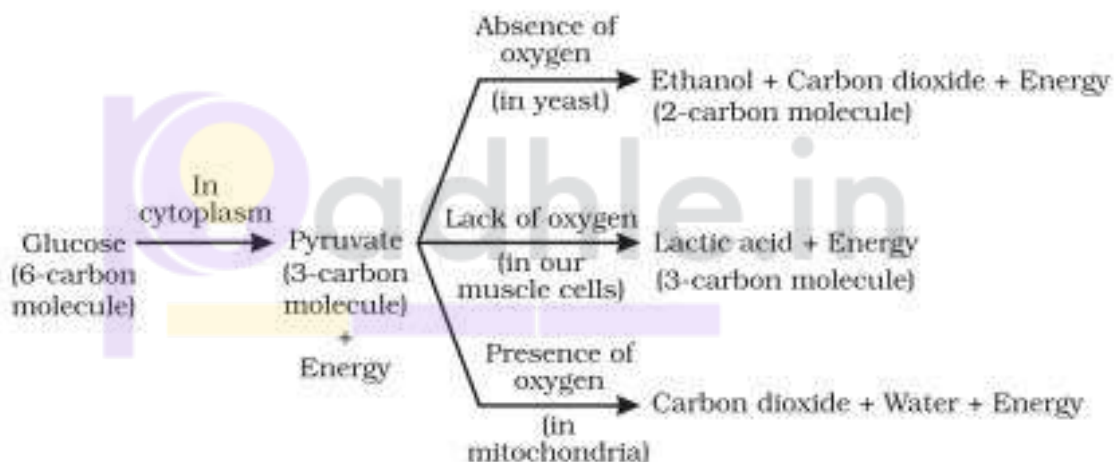
(a) Blood vessels: Transport of blood.

- (b) Blood platelets: Clotting of blood.
  - (c) Lymph: Carries digested fats.
  - (d) Heart: Helps to circulate blood in the whole body by acting as a pump.
- 

8. Write two different ways in which glucose is oxidized to provide energy in human body. Write the products formed in each case.

[2M, 2019]

**Ans 8.** Following are the two different ways in which glucose is oxidized to provide energy in human body:



9. In the experimental set up to show that " $\text{CO}_2$  is given out during respiration", name the substance taken in the small test tube kept in the conical flask. State its function and the consequence of its use.

[2M, 2019]

**Ans 9.** The substance taken in the small test tube kept in the conical flask is KOH (potassium hydroxide) solution. The  $\text{CO}_2$  produced by germinating seeds is absorbed by KOH solution due to which the air from the bent tube moves into the conical flask, which eventually pulls the water up in the bent glass tube.

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10. Why do herbivores have longer small intestine than carnivores?

**[2M, 2017]**

Ans 10. Cellulose forms the largest part of the herbivore's food. Digestion of cellulose takes a longer time, because the enzymes are produced by the **ruminant** bacteria that live in the gut of the herbivore. Longer small intestines ensure that the food stays for a longer duration and proper digestion is possible. In the case of carnivores, cellulose is not present in the diet, thus the length of the small intestine is less.

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11. How is small intestine designed to absorb digested food?

**[2M, 2017]**

Ans 11. The design of the small intestine is such that it provides the maximum area for the absorption of digested food and its transportation to different parts of our body through blood vessels. For these purposes the inner lining of small intestine has **finger like projections** called villi providing a large surface area for absorption and the small intestine is supplied richly with blood vessels for the efficient transportation of the absorbed food.

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12. How are fats digested in our bodies? Where does this process take place?

**[NCERT 2017]**

Ans 12. Fat digestion takes place in the small intestine. The alkaline secretion of the liver, bile, is carried to the small intestine by the bile duct. The process starts with emulsification (**break down**) of large fat globules by the salt of bile into smaller **micelles** to facilitate further enzymatic reaction and digestion process. The fat-digesting lipase enzyme in pancreatic juice and intestinal juices digest the fat in micelles into **triacylglycerols** and then fatty acids and glycerols. These fat digestion products are then absorbed by the **intestinal mucosa** and are carried



to tissues by the lymphatic system and blood where they either serve as energy fuel or are stored after **re-esterification**.

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13. Explain the significance of peristaltic movement that occur all along the gut during digestion.

**[2M, 2010, 2011]**

Ans 13. Peristaltic movement is the type of movement in which there is the constriction and relaxation of muscles of the esophagus, intestine, and stomach. It is a wave-like structure, which starts in the esophagus when the bolus of food is swallowed. The contraction and relaxation of the muscles during the peristaltic movement help in bringing down the food with the food pipe into the stomach. It is an important and automatic process which helps in movement of food.



14. State the necessary conditions for autotrophic nutrition and name the by product. Mention the source of this by product.

**[3M, 2015]**

Ans 14. The autotrophic organisms are **self-feeders** that can synthesize the organic compounds using carbon dioxide as a source of carbon and water as an electron donor. Green plants are **photoautotrophs** that carry out photosynthesis,

a process that requires atmospheric carbon dioxide, water, sunlight, and chlorophyll.

The energy of sunlight is trapped by chlorophyll and is used to fix carbon dioxide into organic compounds (glucose) in the presence of water. These organic compounds are used by plants for their own growth and maintenance and stored in the form of starch that serves as a source of energy when required. Since water molecules serve as an electron donor, oxygen is produced during the process of photosynthesis as a **by-product** and is released into the air.

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15. In human alimentary canal, name the site of complete digestion of various components of food. Explain the process of digestion. **[3M, 2012]**

Ans 15. In the small intestine, complete digestion of various components of food take place. The process of digestion of food in mouth, stomach and small intestine in human body are as follows:

**Mouth:** Digestion of food begins in the mouth. Saliva present in mouth contains a digestive enzyme, called salivary amylase, maltose and **dextrins**, which breaks down starch into sugar.

**Stomach:** Stomach stores and mixes the food received from the oesophagus with gastric juices. The main components of gastric juice are **hydrochloric acid, mucus** and **pepsinogen**. Hydrochloric acid dissolves bits of food and creates an acidic medium. In this medium, pepsinogen is converted to pepsin which is a protein-digesting enzyme. Mucus protects the inner lining of the stomach from the action of **HCl**.

**Small Intestine:** Small intestine is the site of complete digestion of carbohydrates, proteins and fats. Small intestine produces intestinal juice from the glands present in its wall. The intestinal juice helps in further digestion of food. Small intestine also obtains digestive juices from liver and pancreas. The liver produces bile juice that causes emulsification of

fats and the pancreas produces pancreatic juice for digesting proteins and emulsified fats. This digested food is finally absorbed through the intestinal walls.

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16. How are oxygen and carbon dioxide transported in human beings? How are lungs designed to maximize the area for exchange of gases?

[3M,2008]

Ans 16. (i) Respiratory pigment haemoglobin takes up  $O_2$  from the air in the lungs and carries it to tissues.

(ii)  $CO_2$  is being transported from various tissues into the alveoli by blood and is released during exhalation.

Within the lungs, the trachea divides into smaller and smaller tubes which finally terminate in balloon-like structures called alveoli. These alveoli increase the surface area for the exchange of gases.

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17. Write three types of blood vessels. Give one important feature of each.

[3M,2019]

Ans 17. **Features:**

(a) Arteries are the vessels which carry blood away from the heart to various organs of the body. Since the blood emerges from the heart under high pressure, the arteries have thick, elastic walls.

(b) Veins collect the blood from different organs and bring it back to the heart. They do not need thick walls because the blood is no longer under pressure, instead they have valves that ensure that the blood flows only in one direction.

(c) Capillaries are the **smallest** vessels which have walls and are one-cell thick. Exchange of material between the blood and surrounding cells takes place across this thin wall.

18. Write any three differences between aerobic and anaerobic respiration.

[3M, 2008]

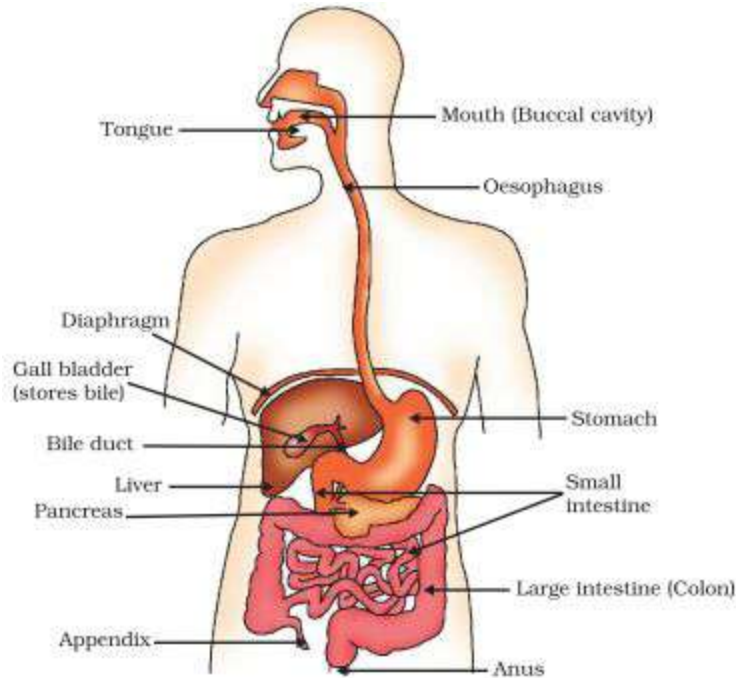
Aerobic Respiration	Anaerobic Respiration
Oxygen is present when this form of respiration takes place.	Oxygen is absent when this form of respiration takes place.
Gases are exchanged in this form of respiration.	Gases are not exchanged in this form of respiration.
It can be found in the cytoplasm and the mitochondria.	It can be found only in the cytoplasm.
Glucose breaks down into carbon dioxide and water.	Glucose breaks down into ethyl alcohol, carbon dioxide, and energy
All higher organisms such as mammals have this type of respiration.	Lower organisms such as bacteria and yeast use this type. In other organisms, it occurs during heavy activities

19. (a) Draw a diagram of human alimentary canal and label on it :

Oesophagus, Gall bladder , Liver and Pancreas

(b) Explain the statement, 'Bile does not contain any enzyme but it is essential for digestion.'

[5M, 2009]



Ans 19. (a)

(b) Bile does not contain any enzyme, but it plays an important role in digestion because:

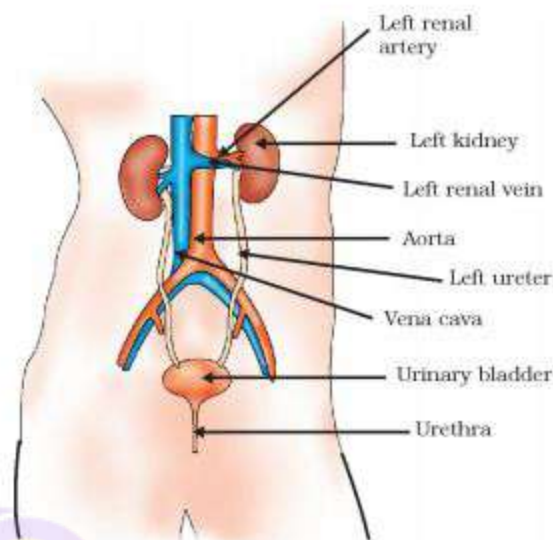
- (i) The bile salts emulsify fat by acting on large fat globules to break them into smaller globules. This increases the efficiency of pancreatic enzymes.
- (ii) The food entering the small intestine is acidic. It is made alkaline by the action of bile juice so as to facilitate the action of pancreatic enzymes.

20. (a) Draw a diagram of excretory system in human beings and label on it:

Aorta, vena cava, urinary bladder, urethra

(b) List two vital functions of the kidney.

(a)



(b) The two vital functions of kidney are:

- (i) It **filters** out the nitrogenous wastes from the blood and forms urine.
- (ii) It also **regulates** the water balance and levels of mineral ions in the body

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21. Explain the process of digestion of food in mouth, stomach and small intestine in human body.

**[5M, 2010]**

Ans 21. (i) Mouth : In mouth, large food pieces are crushed with the help of our teeth and mixed with saliva secreted by the salivary glands, using the tongue. Salivary amylase, the enzyme present in saliva, breaks down starch to give sugar.

(ii) Stomach : The muscular walls of the stomach help in mixing the food thoroughly with the digestive juices secreted by the gastric glands present in the wall of the stomach. These glands release hydrochloric acid, a protein digesting enzyme called pepsin, and mucus, which protects the inner lining of the stomach. The **hydrochloric acid** creates an acidic medium which facilitates the action of the enzyme pepsin.

(iii) Small intestine : The small intestine is the site of the complete digestion of carbohydrates, proteins and fats. It receives the secretions of the liver and pancreas for this purpose. Bile juice from liver makes the acidic food coming from stomach alkaline for facilitating the action of pancreatic enzymes. Bile also emulsifies fats so as to increase the efficiency of enzyme action.

The pancreas secretes pancreatic juice which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats.

The walls of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the proteins into amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

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22. (a) List the three events that occur during the process of photosynthesis. Explain the role of stomata in this process.

(b) Describe an experiment to show that "sunlight is essential for photosynthesis."

**[5M, 2010]**

Ans 22. (a) The three events that occur during the process of photosynthesis are:

- (i) Absorption of light energy by chlorophyll.
- (ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.
- (iii) Reduction of carbon dioxide to carbohydrates.

Stomata help in exchange of gases (carbon dioxide and oxygen) for the purpose of photosynthesis.

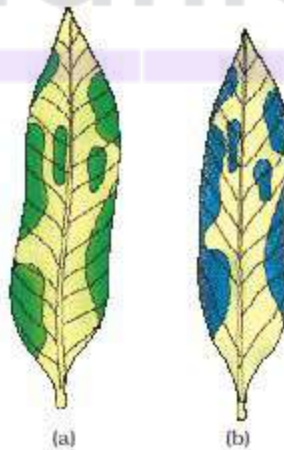
(b) Select a healthy potted plant and destarch the plant by placing it in complete darkness for at least 48 hours.

1. After 48 hours, using clips or cellotape cover a part of the leaf of the plant from both upper and lower sides with black paper strips.
2. Now, keep the potted plant in sunlight for at least 3-4 hours.
3. After 3-4 hours, pluck the leaf and remove black paper strips.
4. Boil the leaf in water for about 2 minutes.

5. Now, to decolourise the leaf, transfer the leaf from boiling water to a beaker containing ethanol and boil the leaf in a water bath.
6. Remove the leaf from beaker and wash it in water at room temperature.
7. Place this leaf in petri dish and add few drops of iodine solution over the decolourised leaf.
8. The area of the leaf that was uncovered performed photosynthesis and will have starch, therefore turned blue-black with iodine solution.
9. The covered portion of the leaf remains yellow as it does not perform photosynthesis.

### OBSERVATIONS:

1. The uncovered part of the leaf turns blue-black. This confirms the presence of starch.
2. The covered portion of the leaf remains yellow showing that no starch synthesis occurred in this region.



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23. (a) Mention any two components of blood.

(b) Trace the movement of oxygenated blood in the body.



(c) Write the function of valves present in between atria and ventricles.

(d) Write one structural difference between the composition of arteries and veins.

**[5M, 2018]**

**Ans 23.**

(a) Two components of blood are

(i) Blood plasma

(ii) Blood cells

(b) Movement of oxygenated blood in the body as follows

Pulmonary veins → Left atrium → Left ventricle → Systemic aorta → All part of the blood

(c) The valves in the heart are to prevent the backflow of blood when the atria or ventricles contract.

(d) Arteries are thick walled whereas veins are thin walled.

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24. (a) Define excretion.

(b) Name the basic filtration unit present in the kidney.

(c) Draw excretory system in human beings and label the following organs of excretory system which perform following functions:

(i) Form urine

(ii) Is a long tube which collects urine from kidney

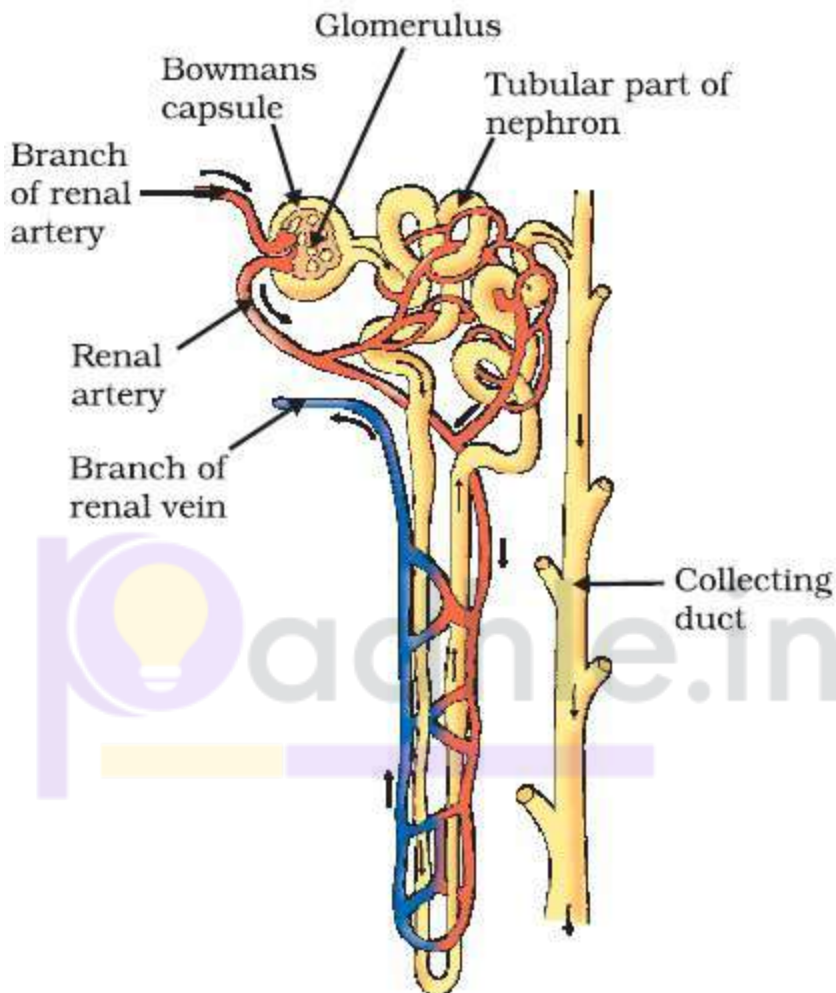
(iii) Store urine until it is passed out

**[5M,2018]**

**Ans 24.**

(a) The biological process involved in the removal of these harmful metabolic wastes from the body is called **excretion**.

(b) The nephron is the filtration units present in the kidney.



(c)

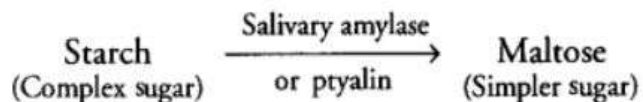
25. Explain the process of digestion of food in the mouth, stomach and small intestine in

the human body.

[5M, 2016]

Digestion of food occurs in following ways in:

(i) **Mouth** (Buccal cavity) The mouth contains teeth, which crushes the food into small particles. Salivary glands present in the mouth secrete saliva which **moistens** the food. It also contains enzyme salivary amylase, that acts as



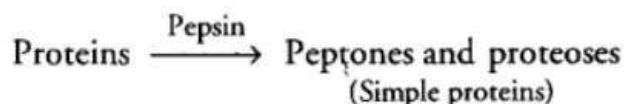
(ii) **Stomach** Gastric glands are present in the wall of the stomach which releases the following secretions:

(a) **Hydrochloric acid** To make the medium acidic for the action of enzyme

pepsin.

(b) **Mucus** To protect the inner lining of the stomach from the action of acid.

(c) **Pepsin** A protein digesting enzyme.



(iii) **Small intestine** It is the site of complete digestion of carbohydrates, proteins

and fats. It receives secretions from liver and pancreas.

(a) **Bile juice** It is secreted by liver and performs the following functions :

It makes the medium alkaline for the pancreatic enzymes to act and also

breaks down large fat globules into smaller globules.

(b) **Pancreatic juice** It is secreted by pancreas. Contains enzymes like amylase

for digesting starch, trypsin for digesting proteins and lipase for breaking

down emulsified fats.

(c) **Intestinal juice** It is secreted by the walls of the small intestine.

Contains a

number of enzymes such as maltase, lipase etc., for complete digestion.

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26. (a) List the three events that occur during the process of photosynthesis. Explain the role of stomata in this process.

(b) Describe an experiment to show that “sunlight is essential for photosynthesis.”

[5M, Delhi 2010]

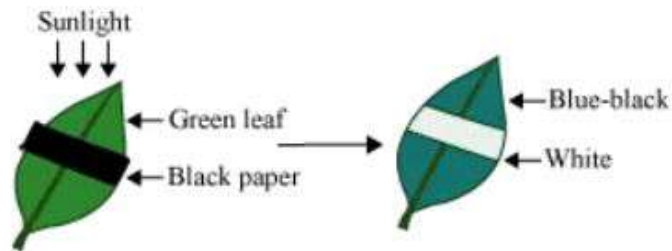
**Ans 26.** (a) The three events that occur during the process of photosynthesis are:

- (i) Absorption of light energy by the green pigment chlorophyll.
  - (ii) Conversion of light energy into chemical energy and the splitting of water molecule into hydrogen and oxygen.
  - (iii) Reduction of carbon dioxide into carbohydrate. Role of Stomata are tiny pores present on the surface of leaves. They are also present on the surface of young stems. Stomata are mainly engaged in the exchange of gases (entry of  $\text{CO}_2$  and release of  $\text{O}_2$ ) associated with photosynthesis. Plant closes the stomata when it does not need  $\text{CO}_2$  for photosynthesis.
- (b) Sunlight is essential for photosynthesis

Procedure: (i) Place a healthy green potted plant in a dark room for 1-2 days. This is done to ensure that the plant consumes all its reserve food and the leaves do not contain any starch.

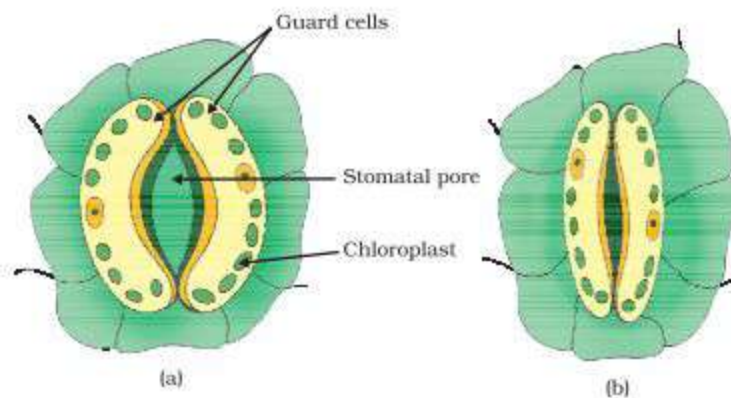
(ii) Then, cover a portion of a leaf of this plant on both sides with two uniform pieces of black paper, fixed in position with two paper clips.

(iii) Now, expose this plant to bright light. After a few hours, remove the leaf and decolorize it with alcohol and test the presence of food (starch) with iodine solution. Observation: It can be observed that the portion of the leaf covered with black paper does not (food), Conclusion: This is because the food prepared by plants through the process of photosynthesis is stored as starch. Starch reacts with the iodine solution to give blue-black colour. Only those portions of the leaf that were exposed to sunlight could photosynthesis. Hence, gives blue-black colour when tested with iodine. The portion of the leaf covered with black paper did not receive sunlight. Hence, starch was not produced. Thus, it can be concluded that the sunlight is essential for photosynthesis.



27. (a) Draw the structure of a nephron and label the following on it:  
glomerulus, Bowman's capsule, renal artery, collecting duct.  
(b) What happens to glucose that enters the nephron along with filtrate?  
[5M, 2009]

28. (a) Draw a labelled diagram of stomata. List two functions of stomata.  
(b) What are the raw materials used during photosynthesis? Write a chemical equation for photosynthesis.  
[5M, 2011]



- (a) Open pore  
(b) Closed pore

Two functions of stomata are:

(i) Exchange of gases

(ii) Transpiration

(b) Carbon dioxide, water, chlorophyll in the presence of sunlight are the essential raw materials for photosynthesis.

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29. (a) Explain how does the exchange of gases occur in plants across the surface of stems, roots and leaves.

(b) How are water and minerals transported in plants ?

**[5M, 2015]**

Ans 29. (a) In plants there are tiny pores called stomata on leaves and lenticels in the stem which facilitate the exchange of gases. Carbon dioxide is taken in and oxygen given out {during photosynthesis} and vice versa during respiration.

(b) Water and minerals are transported within the plant by the Xylem vessels mainly in an upward direction ; these are part of the vascular system which also includes Phloem vessels.

Phloem transports the products of photosynthesis within the plant, to all parts like the stem, roots, fruits etc. in all directions.

# Assertion Reasoning

**Directions:** In the following questions, a statement of assertion (A) is followed by a statement of reason (R) . Mark the correct choice as:

- (a) Both assertion (A) and reason (R) are correct and reason is the correct explanation of assertion.
- (b) Both assertion (A) and reason (R) are correct but reason is not the correct explanation of assertion.
- (c) Assertion (A) is correct, reason (R) is incorrect
- (d) Assertion (A) is incorrect, reason (R) is correct

30. **Assertion:** Leaves are flat

**Reason:** It places chlorophyll molecules in a way to receive more light.

Ans 30. (a) Both assertion (A) and reason (R) are correct and reason is the correct explanation of assertion.

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31. **Assertion:** In human heart, there is no mixing of oxygenated and deoxygenated blood.

**Reason:** Valves are present in the heart which allow the flow of blood in one direction only.

Ans 31. (b) Both assertion (A) and reason (R) are correct but reason is not the correct explanation of assertion.

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32. **Assertion:** Autotrophic nutrition occurs in green plants

**Reason:** Green plants self-manufacture their food.

Ans 32. (a) Both assertion (A) and reason (R) are correct and reason is the correct explanation of assertion.

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