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LIFE PROCESSES: EXCRETION

CBSE : BIOLOGY

EXCRETION

LIFE PROCESS

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## EXCRETION IN ANIMALS

### EXCRETION :

The biological process of removal of harmful nitrogenous wastes from the body is called **excretion**.

The waste products in animals include :

- (i) Nitrogenous compounds like ammonia, urea and uric acid.
- (ii) Carbon dioxide and water.
- (iii) Excess salts and vitamins.
- (iv) Unwanted medicines

### COMPETITION WINDOW

**Ammonotelic organisms** are those which excrete ammonia. e.g. most aquatic animals.

**Ureotelic organisms** are those which excrete urea. e.g. sharks, frogs, mammals.

**Uricotelic organisms** are those which excrete uric acid. e.g. birds, insects, land snails, many reptiles

**Excretory Organs/Structures in Animals :-**

Animals	<i>Amoeba</i>	Hydra	Flatworm	Earthworm	Insects e.g. cockroach	All chordates
Excretory Structures	Cellular surface	Body surface	Protonephridia (flame cells)	Nephridia	Malpighian tubules	Kidneys
Waste products	CO <sub>2</sub> and ammonia	CO <sub>2</sub> and ammonia	Mainly ammonia	ammonia and urea	Uric acid	Urea

### REVIEW QUESTIONS :-

1. Name the organ system responsible for excretion.
2. Name the excretory structures of *Amoeba*.
3. Name the excretory organs of vertebrates.
4. Name the major excretory product of human beings.
5. What is excretory organs of cockroach ?

### HUMAN EXCRETORY SYSTEM :

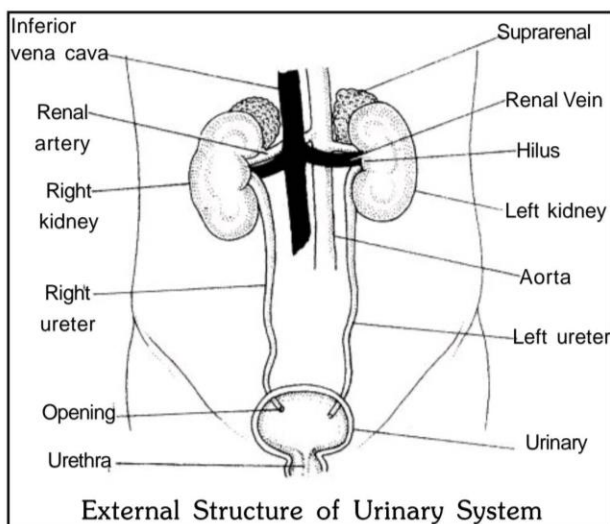
Human excretory system consists of :-

- A pair of kidneys
- A pair of ureters.
- Urinary bladder
- Urethra

### KIDNEY :

The main excretory organ of our body are *kidneys*.

- Colour - Dark red
- Shape - Bean shaped
- Weight - 125-170 gms.
- Size - 10 cm length, 5 cm breadth, 3 cm thickness.
- Position - Located laterally either sides of *vertebral column*.

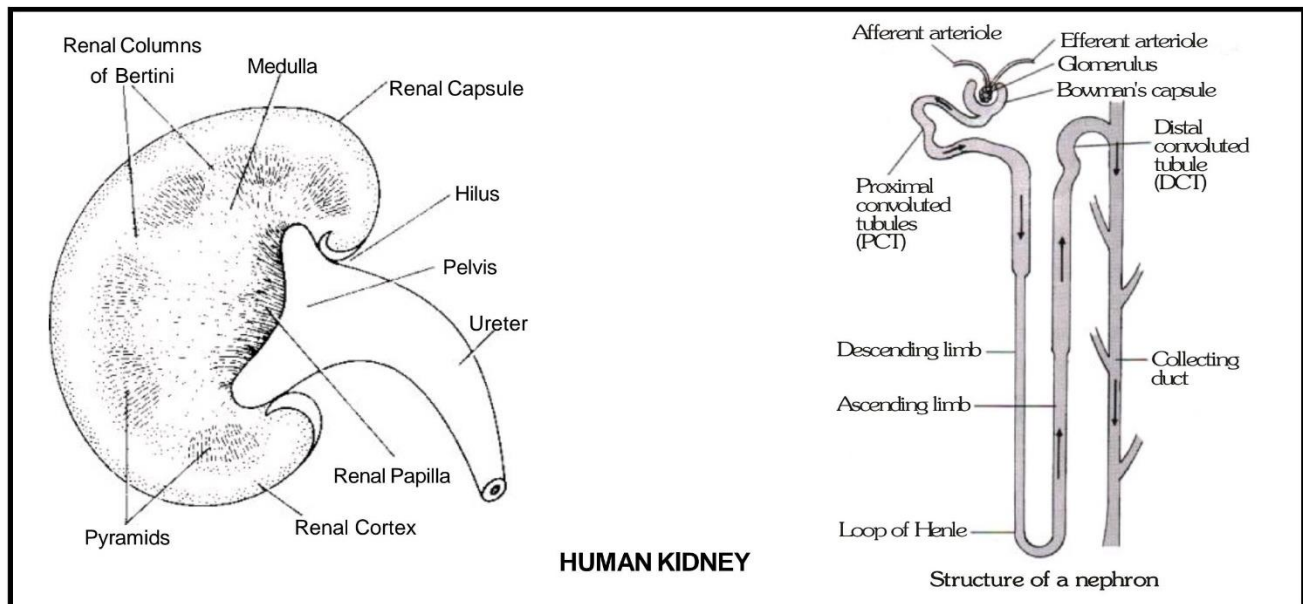


**External Structure :-**

- Each kidney is surrounded and covered by a tough, fibrous, capsule of connective tissues. This capsule is called *renal capsule*.
- Lateral surfaces of kidney are convex while medial surfaces are concave.
- On the inner border of each kidney is a depression called *hilum/hilus*.
- ★ The human kidney are not located at similar positions due to presence of liver above right kidney, so that the right kidney get slightly lower position.

**Internal Structure :**

- The internal structure of kidneys can be divided into two parts.
- Its outer part is called *cortex* and inner part is called *medulla*.
- Nephron is the structural and functional unit of excretion.
- A nephron consists of a long coiled tubule differentiated into **proximal nephron**, **loop of Henle** and **distal nephron**. *The latter opens into the collecting tubule.*
- At the proximal end of the nephron, a double walled cup shaped structure is present called **Bowman's capsule**.
- It consists of network of capillaries called **glomerulus**.



- One end of the **glomerulus** is attached to renal artery and the other end to the renal vein.
- In the glomerulus, blood comes in through afferent arteriole and blood is drained out through efferent arteriole.
- Glomerulus and Bowman capsule are collectively called *Malpighian body* or *renal corpuscle*.
- The function of glomerulus is to filter the blood passing through it. This process is called **ultrafiltration**.

### COMPETITION WINDOW

#### Structure of Nephron :-

Nephron is the structural and functional unit of kidney, which is about 3 cm long and 20-60  $\mu\text{m}$  in diameter. Each kidney has about one million nephrons in humans.

A nephron can be divided into three regions :

- (I) Proximal nephron (Bowman's capsule + Proximal convoluted tubule)
- (II) Loop of Henle (Ascending + Descending limb)
- (III) Distal nephron (Distal convoluted tubule which opens into collecting duct)

- (I) **Proximal nephron** : Nephron tubule is closed at its proximal (starting) end but its distal end is open and continues into the loop of Henle. At the proximal or closed end the nephron is expanded and curved inwardly to form a double walled cup shaped **Bowman's capsule**. Within the Bowman's capsule a network or tuft of capillaries is present, it is called **glomerulus**. Diameter of afferent arteriole is greater than efferent arteriole.

**Malpighian corpuscle** : Glomerulus and its surrounding Bowman's capsule together form this specialised structure.

- (II) **Loop of Henle** : It starts after the proximal convoluted tubule, It ends before the distal convoluted tubule. This hairpin like loop has a descending limb, followed by an ascending limb.

- (III) **Distal nephron** : The ascending limb of Henle's loop merges into **distal convoluted tubule**.

The distal convoluted tubules of a number of adjacent nephrons open into a common **collecting duct** or tubule.

**Ureter :**

- The collecting ducts open into the *ureter*.
- Each ureter originate from interior part of kidney.
- The anterior part of the ureter is broad, like a funnel and called *pelvis* and its posterior part is in the form of long tubule.

**Urinary Bladder :**

- Each ureter opens into the *urinary bladder*.
- The structure of urinary bladder is muscular sac like and pear shaped.
- Its wall is flexible, it collect urine when necessary by the contraction of muscles, the urine is excreted through urethra.

**Urethra :**

- It is a muscular and tubular structure, which extends from the urinary bladder to the outside. It carries the urine to the outside.

**Micturition :**

- Micturition is the term used for urination. (Passing out of urine)

**Functions of Kidney :**

- Regulation of water and electrolyte balance. (Osmoregulation)
- Regulation of acid base balance.
- Regulation of blood pressure.
- Excretion of metabolic waste and foreign chemicals.

### Physiology of Excretion :-

- The impure blood enters to each kidney through *renal artery*.
- The *afferent arterioles* which is branch of renal artery provides blood to the glomerulus.
- Glomerulus is a group of blood capillaries formed by division of afferent arterioles located in Bowman capsule.
- The arterioles which carry blood away from glomerulus are called *efferent arterioles*.
- The radius of afferent arterioles is greater than that of efferent arterioles so the pressure in glomerulus increases. Which is necessary for ultrafiltration.
- Due to the blood pressure, from the blood of afferent arteriole, water, glucose, urea, uric acid and some salt filter in Bowman capsule through *ultra-filtration*.
- It also contains glucose, amino acid and some useful salts along with filtrate.
- This liquid from the Bowman capsule moves through the glandular part of the nephron.
- From where glucose, useful salt and some part of water is *reabsorbed*. The amount of water reabsorbed depends on how much excess water there is in the body and on how much of dissolved waste there is to be excreted.
- The remaining liquid now contain only waste material is called **urine**.
- The urine from the nephron is collected in urinary bladder through ureter.
- Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra.
- By the contraction of muscles of urinary bladder, the urine passes out of the body when necessary.
- All the systems of our body keep the internal environment stable even on the changing conditions of external environment.
- This activity is called *homeostatic* activity.
- Usually the homeostatic activities are performed by excretory organ.
- They not only excrete out salts and nitrogenous waste products but also perform important role of water balance.
- ◆ *The process of maintaining the right amount of water and proper ionic balance in the body is called osmoregulation.*
- ◆ *Urea is always formed in liver through Ornithine cycle.*

### COMPETITION WINDOW

#### Urine Formation (Uropoiesis) :-

It involves three processes : glomerular filtration (ultrafiltration), tubular reabsorption and tubular secretion.

#### (i) Ultrafiltration :-

Walls of glomerulus and Bowman's capsule are thin and semipermeable membrane. In the glomerulus there are many minute pores are present.

Afferent arteriole is wider and releases the blood into glomerulus, whereas efferent arteriole is narrow. Thus, there is development of high blood pressure.

Due to this pressure, separation of small, selective molecules ions from the large molecules in the blood occurs and called ultrafiltration. Fluid which is filtered out from the blood is called as glomerulus filtrate / capsular filtrate / ultrafiltrate.

#### (ii) Tubular Reabsorption :-

The ultrafiltrate contains salts, glucose, amino acids, urea, uric acid and large amount of water.

Glucose, salts, amino acids and water are reabsorbed by various parts of nephron and finally they enter into the surroundings blood capillaries.

#### (iii) Tubular secretion :-

It is removal of wastes from the surrounding blood capillaries into the glomerular filtrate.

Glomerular filtrate entering collecting duct is called **urine**. Urine composition is different from filtrate by the loss as well as gain of many substances during the course of nephrons.

#### ❑ Chemical composition of urine :

- ❑ Urine is slightly acidic liquid, light yellow in colour.
- ❑ The healthy human being has 95% water, 5% urea, uric acid and salts of phosphoric acid.
- ❑ A young and healthy person excretes 1.5-1.8 litres urine per day.
- ❑ This quantity may increase due to intake of tea, coffee, wine etc.

### REVIEW QUESTIONS

1. Name three nitrogenous wastes produced during the metabolism.
2. Name various parts of excretory system of man.
3. What are the functional units of human kidneys ?
4. Give the technical term for the process of expelling of urine.
5. Where is the urine carried through ureters ?
6. What is urethra ?
7. Name the functional and structural unit of kidney.
8. Name the U-shaped tubule of nephron ?
9. Why is urine yellow in colour ?

#### ❑ Regulation of excretion :

Following two hormones regulate the functions of kidney :

#### (i) Anti Diuretic Hormone (ADH)/Vasopressin

It is secreted by pituitary gland, it promotes the reabsorption of water through nephrons. (DCT part)

#### (ii) Aldosterone :- It is secreted by Adrenal gland.

Aldosterone promotes the reabsorption of salts ( $\text{Na}^+$ ) in the nephron (DCT part) i.e. it checks the loss of  $\text{Na}^+$  ions through urine.

❑ **Role of lungs in excretion**

Human lungs eliminate around 18L of CO<sub>2</sub> per hour and about 400ml of water per day in normal resting condition. Water loss via the lungs is small in hot humid climate and large in cold dry climates.

❑ **Role of skin in excretion :**

Human possess two types of glands :

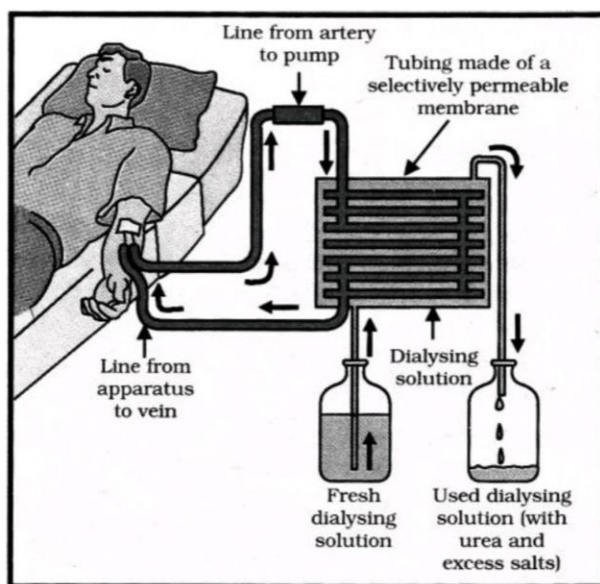
- (1) **Sweat glands :** These excrete sweat, Sweat contain 99.5%, Water, NaCl, Lactic acid, Urea, Amino acid and glucose.
- (2) **Sebaceous glands :** These secrete sebum which contain waxes, sterols, other hydrocarbons and fatty acids.

❑ **Role of liver in excretion :**

Liver is the main site for elimination of cholesterol, bile pigments (bilirubin & biliverdin), inactivated products of steroid hormones, some vitamins and many drugs. Bile carries these materials to the intestine from where they are excreted with the faeces.

**ARTIFICIAL KIDNEY OR HAEMODIALYSIS**

Kidney dialysis also known as haemodialysis or renal dialysis, is a medical treatment used to remove nitrogenous waste materials from the blood of patients lacking kidney function or kidney failure, due to infections, injury or restricted blood flow to kidneys. In this procedure, the blood is circulated through a machine known as artificial kidney or dialyser that removes wastes and excess fluid from the bloodstream.



The blood from an artery is pumped through a dialyser or artificial kidney, where it flows through a semipermeable membrane which are made up of cellophane tubes. The cellophane tubes remain suspended in a tank filled with dialysing fluid which has same osmotic pressure as blood and has the same composition as that of blood plasma but it lacks nitrogenous wastes. When the blood of the patient is passed through the cellophane tubes, the dialysis fluid passing on the other side of the membrane removes unwanted elements in the blood by diffusion. The blood is then returned to the body through a vein.

Main difference of kidney & dialysis is that there is no reabsorption in dialysis. In kidney, initial filtrate is about 180L daily but actual excretion is only a litre or two a day.

### REVIEW QUESTIONS

1. Give the technical term for the dialysing machine.
2. Name two functions of human kidneys.
3. Define uraemia.
4. What is the main aim of excretion ?
5. Which part of kidney acts as dialysis bag ?

### COMPETITION WINDOW

- \* **Anuria** :- No production of urine
- \* **Polyuria** :- Excess production of urine. More urine formation takes place due to less secretion of ADH. Due to less secretion of ADH, the amount of water increases in the urine. So, the patient feels thirsty again and again. This disease is called **Diabetes insipidus**.
- \* **Glycosuria** :- Excretion of glucose through urine. This sign is present in **Diabetes mellitus**. This disease is caused mainly due to less secretion of insulin.
- \* **Uremia** :- Excess of urea in blood is termed as uremia.
- \* **Calculi and cast** :- It is also termed as **Kidney-stone**. Due to deposition of Calcium-oxalate in the kidney, stone is formed. Sometimes, calcium - phosphate and calcium-sulphate are also found. These are insoluble-salts. Normally, these are not excreted by the urine.
- \* **Haematuria** :- Excretion of blood through urine.
- \* **Diuresis** :- The process of excess formation of urine in the kidney's is termed as diuresis.
- \* The urine on standing gives a pungent smell. It is due to conversion of urea into ammonia by bacteria
- \* The volume of urine produced per day will increase on a cold day, due to ↓ADH secretion.
- \* If one kidney is removed, the remaining one enlarges and performs function of both kidneys.
- \* **Renal failure** : It is a syndrome characterised by renal dysfunction, oliguria, anuria, sudden rise in metabolic waste products like urea & creatinine in blood (uremia) . It is either of acute (sudden onset) or chronic (slow onset) nature.
- \* **Diabetic nephropathy** : It is a complication due to diabetes mellitus where the kidney progressively gets damaged leading to death ultimately due to renal failure.
- \* Pale yellow colour of urine is due to the **Urochrome** pigment. It is formed in the blood due to the reduction of Haemoglobin. So in the body of a healthy animal urochrome is found in a very less amount.



EXERCISE

CHECK YOUR GRASP

OBJECTIVE TYPE QUESTIONS

1. Excretion is :-  
 (1) Removal of substances not required by body  
 (2) Removal of useless substances and substances present in excess  
 (3) Formation of substances having some role in body  
 (4) All the above
2. In mammals, the urinary bladder opens into :-  
 (1) Uterus (2) Urethra (3) Vestibule (4) Ureter
3. Malpighian corpuscles occur in :-  
 (1) Medulla (2) Cortex (3) Pelvis (4) Pyramid
4. Loops of Henle occurs in :-  
 (1) Cortex (2) Medulla (3) Pelvis (4) Ureter
5. "Homeostasis" term was proposed by :-  
 (1) Claude Bernard (2) Walter Cannon (3) Marcello Malpighi (4) Henle
6. Bile pigments are formed in :-  
 (1) Liver (2) Spleen (3) Every body cells (4) 1 & 2 both
7. Excretory materials are formed in :-  
 (1) Kidney (2) Rectum (3) Liver (4) Every cell in body
8. Diameter of the renal afferent vessel is :-  
 (1) Same as that of efferent (2) Smaller than that of efferent  
 (3) Larger than that of efferent (4) There is no efferent vessel
9. Nitrogenous waste products are eliminated mainly as :-  
 (1) Urea in tadpole & ammonia in adult frog (2) Ammonia in tadpole and urea in adult frog  
 (3) Urea in both tadpole & adult frog. (4) Urea in tadpole and uric acid in adult frog.
10. Which blood vessel contains the least amount of urea ?  
 (1) Hepatic vein (2) Renal vein (3) Hepatic portal vein (4) Renal artery
11. Reabsorption of useful substances from glomerular filtrate occurs in :-  
 (1) Collecting tube (2) Loop of Henle  
 (3) Proximal convoluted tubule (4) Distal convoluted tubule
12. Which one is uricotelic ?  
 (1) Frog and toads (2) Lizards and birds  
 (3) Cattle, monkey and man (4) Molluscs
13. What will happen if one kidney is removed from the body of a human being ?  
 (1) Death due to poisoning  
 (2) Uremia and death  
 (3) Stoppage of urination  
 (4) Nothing, the person will survive and remain normal kidney will become hypertrophied
14. In cockroach, the excretory product is :-  
 (1) Ammonia (2) Uric acid (3) Urea (4) Both 1 and 3
15. The mechanism of urine formation in nephron involves :-  
 (1) Ultrafiltration (2) Reproduction (3) Diffusion (4) Osmosis

16. In diabetes mellitus the patient drinks more water as there is urinary loss of :-  
 (1) Salt (2) Insulin (3) Protein (4) Glucose
17. The hormone that promotes reabsorption of water from glomerular filtrate is :-  
 (1) Oxytocin (2) Vasopressin (3) Relaxin (4) Calcitonin
18. Main functions of kidney is :-  
 (1) Passive adsorption (2) Ultrafiltration (3) Selective reabsorption (4) Both 2 and 3
19. Urea is transported by :-  
 (1) Plasma (2) RBC (3) WBC (4) All
20. Micturition is :-  
 (1) Removal of urea from blood (2) Removal of uric acid  
 (3) Passing out urine (4) Removal of faeces
21. Ornithine cycle performs :-  
 (1) ATP synthesis (2) Urea formation in spleen  
 (3) Urea formation in liver (4) Urine formation in liver
22. The snakes living in deserts are mainly :-  
 (1) Ammonotelic (2) Aminotelic (3) Ureotelic (4) Uricotelic
23. Which excretory material is least toxic :-  
 (1) Ammonia (2) Urea (3) Uric acid (4) All are equally toxic
24. Correct order of excretory organs in cockroach, earthworm and rabbit respectively :-  
 (1) Skin, malpighi tubules, kidney (2) Malpighi tubules, nephridia, kidney  
 (3) Nephridia, malpighi tubules, kidney (4) Nephridia, kidney, green gland
25. The yellow colour of urine of the vertebrates is due to :-  
 (1) Cholesterol (2) Urochrome (3) Uric acid (4) Melanin
26. In the kidney, the formation of urine involve the follwing processes arranged as :-  
 (1) Glomerular filtration, reabsorption and tubular secretion  
 (2) Reabsorption, filtration and secretion  
 (3) Secretion, absorption and filtration  
 (4) Filtration, secretion and reabsorption
27. A condition of failure of kidney to form urine is called :-  
 (1) Deamination (2) Entropy (3) Anuria (4) None of these
28. Excretion is carried out by nephridia in :-  
 (1) cockroach (2) amoeba (3) earthworm (4) human
29. Urea is formed in :-  
 (1) Liver (2) Spleen (3) Kidney (4) Lungs

**FILL IN THE BLANKS :-**

1. The excretory system of human beings includes a pair of ....., a pair of ....., a .....and a .....
2. Kidneys are located in the ..... one on either side of the .....
3. Urine is stored in .....
4. CO<sub>2</sub> is removed from the blood in the .....
5. Nitrogenous waste in human beings is .....
6. Functional unit of kidney is .....
7. The urinary bladder is muscular and is under ..... control.
8. Passing of urine from body is called .....
9. An artificial kidney is a device to remove nitrogenous waste products from the blood through .....
10. Artificial kidney contain a number of tubes with a ..... lining, suspended in a tank filled with dialysing fluid.
11. Dialysing fluid has the ..... osmotic pressure as blood.
12. Glomerular filtration rate in one day in human beings is ..... L.
13. Excretory organs in fishes are .....
14. Artery which carry blood into kidney is .....
15. Double walled cup shaped structure in nephron is called .....
16. Tuft of capillaries in Bowman's capsule is called .....
17. Structure which help in excretion in tapeworm is .....
18. The structure which help in excretion in earth worm is .....
19. Urine leaves the kidney through .....
20. Substance which is completely reabsorbed by nephron is .....

**MATCH THE COLUMNS :**

Column I		Column II	
(i)	Loop of Henle	(a)	Counter current system
(ii)	Glomerulus	(b)	Hypertonic urine
(iii)	Vasa recta	(c)	Urine concentration
(iv)	ADH	(d)	Ultrafiltration
(v)	Ureotelism	(e)	Frog
		(f)	Shark

**TRUE AND FALSE :**

- Micturition is carried out by a reflex.
- ADH help in water elimination making the urine hypotonic.
- Henle's loop plays an important role in concentrating the urine.
- Glucose is completely reabsorbed in the PCT.
- Ureter is the reservoir of urine in the body.
- Kidneys filter about 180 L urine per day.
- Functional unit of kidney is nephron.
- Human being is uricotelic.
- Collecting duct is not a part of nephron.
- Glomerulus is a tuft of capillaries around loop of Henle.

**EXCRETION IN ANIMAL      ANSWER KEY      EXERCISE # 1**

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	2	2	2	2	4	4	3	2	2	3	2	4	2	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Ans.	4	2	4	1	3	3	4	3	2	2	1	3	3	1	

● **FILL IN THE BNALKS :**

- |   |                      |                    |
|---|----------------------|--------------------|
| 1. Kidneys, ureters, urinary bladder, urethra | 2. abdomen, backbone | 3. Urinary bladder |
| 4. Lungs                                      | 5. Urea              | 6. Nephron         |
| 8. Micturition                                | 9. Dialysis          | 10. Semi permeable |
| 12. 180                                       | 13. Kidneys          | 14. renal artery   |
| 16. Glomerulus                                | 17. Flame cell       | 18. Nephridia      |
| 20. Glucose                                   |                      | 19. Urethra        |

● **MATCH THE FOLLOWING :**

(i) – (b), (ii) – (d), (iii) – (a), (iv) – (c), (v) – (e, f)

● **TRUE AND FALSE :**

True or False										
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	T	F	T	T	F	T	T	F	T	F

## EXERCISE # 2

## (FOR SCHOOL / BOARD EXAMS)

### VERY SHORT ANSWER QUESTIONS :

1. Name the structural and functional unit of kidney.
2. Why is urine yellow in colour ?
3. Name the structure which stores urine temporarily.
4. Name the U shaped tubule of nephron.
5. What is the main drawback of artificial kidney ?
6. Name the tube which passes out urine from urinary bladder.
7. Name the chief nitrogenous waste materials in human beings.
8. What is the advantage of presence of two kidneys in man ?
9. Name two parts of a nephron.
10. Where does ultrafiltration occur in nephron ?
11. Name three parts of nephric tubule.
12. Define glomerulus.
13. Give the technical term for passing the useful substances from nephric filtrate back into blood in blood capillaries.
14. Give the technical term for the process of expelling of urine.
15. Which part of skeleton protects the kidney ?

### SHORT ANSWER QUESTIONS :

1. Define :
  - (a) Osmoregulation
  - (b) Haemodialysis
  - (c) Malpighian body
2. Name the excretory matter in :

(a) Fishes	(d) Birds	(b) Tadpole	(e) Human
(c) Frog	(f) Earthworm		
3. What is the role of afferent and efferent arteriole in glomerular filtration ?

4. Explain the role of ADH in excretion.
5. Differentiate between ureter and urethra.
6. What will happen if there is no tubular reabsorption in the nephrons of kidneys?
7. Differentiate between excretion and osmoregulation.
8. How is the amount of urine produced regulated?
9. What happens to glucose which enters the nephron along with filtrate during excretion in human beings?  
 State two vital functions of kidney.

**LONG ANSWER QUESTIONS :**

1. Where and how is urea produced in ureotelic animals? What happens to the kidney filtrate in descending limb of loop of Henle?
2. Describe the structure of human nephron.
3. Briefly state the mechanism of urine formation in human kidney.
4. Explain the structure of kidney with the help of a well labelled diagram.
5. Explain the following, why?
  - (a) Mammals are ureotelic, but birds are uricotelic
  - (b) Skin functions as an accessory excretory organ.
  - (c) Frog is ureotelic but tadpole is ammonotelic.
  - (d) Urine infection is more common in women than men.
  - (e) Frequency of urination increases after consuming alcoholic beverages.

EXCRETION IN ANIMALS	ANSWER KEY	EXERCISE # 2
● VERY SHORT ANSWER QUESTION :		
1. Nephron	2. due to a pigment urochrome	3. Urinary bladder
4. Loop of Henle	5. There is no reabsorption of useful substances	6. Ureter
7. Ammonia, Urea, Uric acid	8. If one kidney fails man can live on the other kidney.	
9. Bowman's capsule and nephric tubule.	10. Bowman's capsule	
11. PCT, loop of Henle, DCT		
12. A tuft of capillaries present in the cavity of Bowman's capsule.		
13. Selective reabsorption	14. Micturition	15. 11 <sup>th</sup> , 12 <sup>th</sup> ribs.

## EXERCISE # 3 (FOR COMPETITIVE EXAMS)

1. Contraction of right ventricle pumps blood into :-  
(A) right auricle (B) pulmonary artery (C) pulmonary vein (D) dorsal aorta
2. Urine leaves the kidney through :-  
(A) Urethra (B) collecting duct (C) renal vein (D) ureter
113. Urea, a nitrogenous waste, requires a large amount of water. Therefore it is the main excretory product in :-  
(A) protozoans, amphibians and reptiles (B) elasmobranchii, adult amphibians  
(C) reptiles, birds and mammals (D) insects, birds and fishes
114. In which of the three groups of the following mammals is uric acid also excreted out :-  
(A) Carnivora, insectivora and marsupials (B) Elephants, chiroptera, primates  
(C) Logomorpha, man, horse (D) Man, apes, dalmatian dog
115. In *Hydra* and *Amoeba*, ammonia is the main nitrogenous waste. Lizards, snakes, birds and insects excrete mostly uric acid but crocodiles and alligators excrete mainly ammonia through they are reptiles. So can we generalise that :-  
(A) there is no uniform pattern of removal of nitrogen wastes  
(B) aquatic and land animals excrete urea  
(C) animals that fly excrete uric acid  
(D) nitrogen waste excretion is closely related to the availability of water in the environment
116. The white matter in a bird's dropping is :-  
(A) calcium carbonate (B) calcium sulphate  
(C) uric acid (D) urea
118. Kidney is an excretory and regulatory organ. Which two of the following are regulated effectively by kidneys?  
(A) CO<sub>2</sub> and protein (B) Sugar and O<sub>2</sub> (C) Water and salts (D) Water and fat
119. The main function of the skin is to protect the underlying delicate tissues from environmental factors ; in addition, it performs several other functions. Some are given below. Which of the following functions is excretory in nature ?  
(A) Giving out of urea and uric acid in sweat (B) Detection of changes in temperature  
(C) Regulation of body temperature (D) Detection of pressure, pain or touch etc

120. Liver is an important gland of the body. In addition to its function in digestion and food storage, the liver participates in excretion. Which of the following function(s) :-
- (A) Deamination and urea formation (B) Elimination of haemoglobin and bile salts  
 (C) Inactivation of chemicals after their role is over (D) All the three mentioned above
122. Presence of a large number of mitochondria in the tubule cells of nephrons suggests that the nephron is involved in the process of :-
- (A) passive transport (B) active transport (C) formation of urea (D) diffusion
123. Which of the following parts of a kidney contains the lowest concentration of urea ?
- (A) Loop of Henle (B) Branches of venal vein (C) Bowman's capsule (D) Glomerulus
124. Uriniferous tubules of a kidney are concerned with the formation of :-
- (A) glucose (B) amino acids (C) hormones (D) urine
125. Removal of faeces or undigested food from the body is not an example of excretion because :-
- (A) faeces is given out of the alimentary canal (B) it has not been digested by the body  
 (C) undigested food is not a product of metabolism (D) if it remains in the body, it produces foul gases
126. Dialysis is carried out in case:-
- (A) both kidneys are damaged (B) brain and spinal cord are damaged  
 (C) heart and lungs are damaged (D) liver and spleen do not function
15. Excretory organs in *Amoeba* are :-
- (A) Contractile vacuoles (B) Cellular surface  
 (C) Mitochondria (D) None of these

**ANSWER KEY**

Q.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	D	B	D	D	C	C	A	D	B	B	D	C	A	D



## EXCRETION IN PLANTS

**EXCRETION** : The process of removal of toxic waste products from the body of an organism is known as excretion.

- The main waste products produced by plants are carbon dioxide, water vapour and oxygen.
- $\text{CO}_2$  and water are produced as wastes during respiration by plants.
- $\text{CO}_2$  produced during respiration in day time is all used by the plant itself in photosynthesis. Plants excrete oxygen as a waste only during day time.
- The gaseous wastes of respiration and photosynthesis in plants are removed through the **stomata** in leaves and **lenticels** in woody stem and released to the air.
- Oxygen is produced as a waste during photosynthesis.
- Plants get rid of excess water by **transpiration**.
- Many plant waste products are stored in cellular vacuoles.
- Plants also store some of the waste products in their body parts (leaves, bark and fruits).  
e.g. Tannins, essential oils, latex, gums, resins.
- Tea leaves, amla, betal nut and bark of tree contain tannins.
- Leaves of *Eucalyptus*, lemon, tulsi, contain essential oils.
- Leaves of yellow oleander contain latex.
- Gums are found in babul tree.
- Resins are found in stem of conifers.
- Quinine and morphine are medicines derived from alkaloid stored in *Cinchona bark* and Opium fruits respectively.
- Caffeine found in coffee seeds and nicotine in tobacco leaves are also alkaloids.
- Calcium *Oxalate crystals* accumulate in some tubers like *Yam* (zamikand).

### COMPETITION WINDOW

- The plants excrete carbon dioxide produced as a waste during **respiration** in night time.
- Aquatic plants lose most of their metabolic wastes by direct diffusion into the water surrounding them.
- Terrestrial plants excrete some waste into the soil around them. The plant get rid of stored solid and liquid wastes by the shedding of leaves peeling of bark and felling of fruits.

## EXERCISE # 1

## FOR SCHOOL EXAMS.

### OBJECTIVE QUESTIONS :

- Plant gets rid of excess water by  
 (A) Photosynthesis (B) Respiration (C) Transpiration (D) None of these
- Waste product/s produced by plants is/are  
 (A) CO<sub>2</sub> (B) Water (C) Oxygen (D) All of these
- Waste product produced during respiration in plant :  
 (A) CO<sub>2</sub> (B) Water (C) Oxygen (D) A and B
- In photosynthesis the waste product is :  
 (A) CO<sub>2</sub> (B) Oxygen (C) Nitrogen (D) None of these
- The gaseous wastes of respiration and photosynthesis in plants are removed through :  
 (A) Stomata of leaves (B) Lenticels of stem (C) Stomata and lenticels (D) None of these
- Which of the following statement(s) is / are correct :  
 (A) Gum are found in babul tree  
 (B) Leaves of tulsi contain essential oils  
 (C) Leaves of amla and tea contain tannins  
 (D) All of the above

### FILL IN THE BLANK

- Plants get rid of excess water by .....
- ..... and water are produced as wastes during respiration by plants.
- ..... is produced as a waste during photosynthesis.
- The gaseous wastes of respiration and photosynthesis in plants are removed through the ..... in leaves and ..... in stem and released to the air.
- The plants excrete CO<sub>2</sub> produced as a waste during ..... process in night time.
- Gums and resins are the ..... products of plant.
- The phenomenon of removing of waste product from the body is known as .....
- Leaves of ..... contain essential oils.
- ..... are found in stem of conifers as waste product.
- Aquatic plants lose most of their metabolic wastes by ..... process.

### VERY SHORT ANSWER TYPE QUESTIONS :

- Name the two part of a plant through which its gaseous waste products are released into the air.
- Name a waste gas excreted by the plants only during the day time and only during the night time.
- Name the process by which plants get rid of excess water.

- Name the phenomenon of removing of waste product from the body.
- Name the waste product which is produced by the stem of conifers.
- Name the by products of photosynthesis.
- Name some waste products which are stored by the plants.
- Name the plant from which quinine is obtained .
- Name the plant from which morphine is obtained.
- From which part of opium morphine is obtained ?
- From which part of cinchona quinine is obtained ?

**MATCH THE COLUMN :**

Match the items of Column A with items of Column B.

Column A		Column B	
(A)	Waste product of respiration	(i)	Resin
(B)	Waste product of photosynthesis	(ii)	CO <sub>2</sub>
(C)	Leaves of lemon	(iii)	essential oil
(D)	Stem of conifers	(iv)	O <sub>2</sub>

**SHORT ANSWER TYPE QUESTIONS :**

- Define the excretion
- Write about the various waste products produced by the plants.

**LONG ANSWER TYPE QUESTION :**

- What are the methods used by plant to get rid of excretory process.

[NCERT QUESTION]

EXCRETION IN PLANTS	ANSWER KEY	EXERCISE-1 (X)-CBSE
<p>● OBJECTIVE QUESTION :</p> <p>1. (C)                      2. (D)                      3. (D)                      4. (B)                      5. (C)                      6. (D)</p>		
<p>● FILL IN THE BNALKS :</p> <p>1. transpiration      2. CO<sub>2</sub>                      3. Oxygen                      4. stomata ; lenticels</p> <p>5. respiration              6. waste                      7. excretion                      8. tulsi / lemon</p> <p>9. Resins                      10. diffusion</p>		
<p>● VERY SHORT ANSWER TYPE QUESTIONS :</p> <p>1. (i) Stomata (ii) Lenticels                      2. O<sub>2</sub> ; CO<sub>2</sub>                      3. Transpiration                      4. Excretion</p> <p>5. Resins                      6. Oxygen ; Water ; Starch                      7. Tanins ; Gums ; Resins ; Latex</p> <p>8. Cinchona                      9. Opium                      10. Fruits                      11. Bark</p>		
<p>● MATCH THE FOLLOWING :</p> <p>1. A - (ii)    B - (iv)    C - (iii)    D - (i)</p>		