

### CHAPTER-3 : CLASSIFICATION OF SUBSTANCES

#### A. Answer the following questions :

1. A substance which dissolves in water to give hydrogen ions as the only positively charged ions is called an acid. An acid has a sour taste. On the basis of their sources acids can be broadly classified into two types :
  - (i) organic acids (ii) mineral acids.
2. General physical properties of acids are :
  - (i) They have a sour taste.
  - (ii) They turn blue litmus into red.
  - (iii) All acidic solutions are conductors of electricity.
  - (iv) They are corrosive in nature.
  - (v) They are soluble in nature.
3. Some uses of acids :
  - (i) Hydrochloric acid is used for cleaning metal surface, kitchen sinks and other sanitary wares. It is also used in dyeing industry and for preparing glucose from starch.
  - (ii) Nitric acid is used in the manufacture of fertilisers and explosives.
  - (iii) Carbonic acid is mixed with citric acid and sugar and is used for making soft drinks.
  - (iv) Tarteric acid is used in the manufacture of baking soda.
  - (v) Acetic acid is used as a table acid for the preservation of food articles.
4. The substances which react with acids to form salt and water as only products are called bases.

All bases which are soluble in water are called alkalis. The most important difference between alkalis and bases is that all alkalis are bases, however all bases are not alkalis.
5. Not, because all bases are not alkalis.
6. Some general properties of bases :
  - (i) Bases are produced when oxides of metals react with water.
  - (ii) Bases are hydroxides of metals.
  - (iii) They have a bitter taste.
  - (iv) They turn red litmus blue.
  - (v) They have a soapy touch.
7. Bases are very useful to us in our daily life because they produce a large number of materials. These materials are used as medicines, soap, paper, paper pulps and other useful items.
8. A chemical reaction in which an acid and a base react and salt and water are formed, is called a neutralisation reaction.
9. Some of the practical applications of neutralisation are as follow :
  - (i) Overproduction of hydrochloric acid causes pain in stomach. Antacid

tablets containing magnesium hydroxide are given to cure stomachic pain. Antacids neutralize excess acid produced in the stomach.

- (ii) The sting of ants and bees contain formic acid. The sharp pain caused by the sting of ants, nettles and bees is due to formic acids. This can be cured by rubbing soap (which is actually basic). The acid base neutralisation reaction takes place which results in reduced pain and more healing.
- (iii) The wastes of many factories contain acids. If they are allowed to flow into the water bodies, the acids will kill fish and other organisms. Hence, before disposing off the factory wastes are neutralised by adding basic substances.
- (iv) Sometimes due to acidic rain or due to excess fertilizers the soil become acidic in nature which can damage the crops. Thus, farmers reduce acidity of the soil by adding calcium hydroxide (which is a base) to it. Thus, acidic content of soil gets neutralised with the base and the crops get saved from being destroyed.

**B. Fill in the blanks :**

1. ascorbic 2. nitric 3. methyl orange 4. hydrochloric 5. formic 6. basic 7. green

**C. Differentiate between :**

**1. Differences between strong and weak acids :**

<b>Strong acids</b>	<b>Weak acids</b>
(i) The acids which dissolve in water to give a large number of positively charged hydrogen ions, are called strong acids.	(i) The acids which dissolve in water to give a small number of positively charged hydrogen ions are called weak acids.
(ii) Examples : Sulphuric acid, nitric acid and phosphoric acid.	(ii) Examples : Carbonic acid, acetic acid, sulphurous acid, formic acid, etc.

**2. Difference between concentrated and dilute acids:**

The acids which contain very little or no amount of water are called concentrated acids. On the other hand, the acids which contain a large amount of water are called dilute acids. A dilute acid is prepared by dissolving concentrated acid in a large amount of water.

**3. Differences between organic and mineral acids :**

<b>Organic acids</b>	<b>Mineral acids</b>
(i) The acids which can obtain from natural organic matter or which acids are produced by plants and animals are known as organic acids.	(i) The acids prepared from minerals present in the earth's crust are known as mineral acids.
(ii) Examples : Citric acid, tartaric acid, lactic acid, formic acid.	(ii) Examples: Hydrochloric acid, sulphuric acid, nitric acid, phosphoric acid.



3. When silver salts are exposed to light they become dark. This is because the light causes silver salts to decompose into metallic silver and chlorine gas.

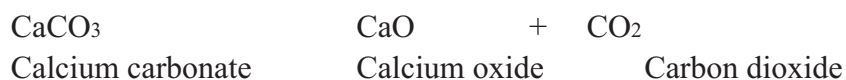


In photography, this reaction has important applications. The photographic film is coated with a thin layer of silver salts. When light falls on the film, the silver ions present in the silver salts are converted to metallic silver. This forms a dark area on the film.

When the film is developed, the unreacted silver salts are washed away, leaving behind the silver. The film, thus obtained is called *negative*.

4. The chemical reaction in which a single substance breaks down into two or more simpler substances upon heating is known as *thermal decomposition*.

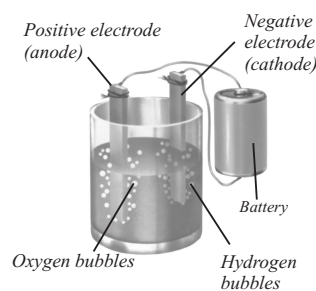
For example, When calcium carbonate is heated carbon dioxide gas is given off.



5. The process of breaking down a substance by passing an electric current through it is called *electrolysis*.

***Electrolysis of water.***

When we pass electric current through water, hydrogen and oxygen gases are evolved. Which are collected in separate tubes.



Electrolysis

6. *Fossil fuels* are compounds of carbon and hydrogen which are formed by animals and plants remains buried in the ground before millions of years.

When these fuels are burnt mainly carbon dioxide, steam and a large amount of heat are produced.

7. Cooking is regarded as a decomposition reaction because when the food items are cooked these complex molecules breakdown into smaller and simpler ones.

Cooking has great importance for all of us as cooked food is easier to digest than uncooked food. Moreover, from the same uncooked food item, many different types of dishes can be prepared by cooking in different ways.

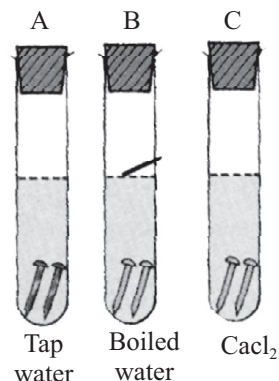
8. Corrosion of iron is known as *rusting*.

**To prove that both air and water are necessary for iron to rust.**

Take three test-tubes marked A, B and C. Put clean nails in all the three test tubes. In test-tube A, put some tap water and seal it with a cork. In test-tube B, put some boiled water and cover it with a layer of wax.

Close this test-tube also with cork. In test-tube C, put some anhydrous calcium chloride and cork it. Leave the set-up for a week.

We'll observe that rusting takes place in test-tube A. Tap water has dissolved air. So the conditions necessary for rusting are present. In test-tube B, rusting is not observed as dissolved air is removed when water is boiled. The wax layer prevents air from dissolving in the water. So, this test tube has only water and no air. Test-tube C has only air as all the moisture is absorbed by calcium chloride. So without moisture, rusting does not take place.



Hence, we can say that both air and water are necessary for iron to rust.

9. Ways to prevent rusting :

(i) **Paints and Grease** : To prevent rusting apply a coat of paint or grease. These coats should be applied regularly to prevent rusting. Paints and grease prevent the articles from coming in contact with oxygen, or water, or both. Hence, if either of two is absent rusting doesn't take place.

(ii) **Galvanization** : It is the process in which a layer of zinc or chromium is deposited over the iron sheets. These metals doesn't allow iron to react with oxygen or moisture and hence, prevent rusting.

(iii) **By alloying** : Another way to prevent rusting is by alloying. Iron is mixed with some other elements like chromium, nickel, manganese and carbon which enhance the properties of iron. As a result, it doesn't undergo rusting so soon.

10. Sea water is collected in tanks and allowed to evaporates slowly under th heat from the sun. Water slowly evaporates leaving behind white crystals of the salt which are then purified to obtain table salt.

**B. Define the following :**

1. **Reactants** : The original substances that take part in the chemical reaction are called reactants.
2. **Products** : The new substances formed as a result of the chemical reaction are known as the *products*.
3. **Oxidation** : The reaction of a substance with oxygen is called *oxidation*.
4. **Rust** : The hydrated iron (III) oxide ( $\text{Fe}_2\text{O}_3 \times \text{H}_2\text{O}$ ) is called rust.

**C. Complete the following chemical reactions.**

1.  $\text{Na}_2\text{SO}_4 + \text{Mg}$   
Sodium sulphate                      Magnesium

2.  $\text{CH}_3\text{COONa} + \text{CO}_2 + \text{H}_2\text{O}$   
Sodium ethanoate                  Carbon dioxide          water
3.  $2\text{NaNO}_2 + \text{O}_2$   
Sodium nitrate                  Oxygen
4.  $\text{FeSO}_4 + \text{Cu}$   
Ferrous sulphate                  Copper

## CHAPTER 5. SURROUNDINGS AFFECT THE LIVING

### A. Answer the following questions:

1. Soil composition varies from place to place. The type of soil depends on the type of rock from which it is formed. All soils, however, contain the following components :
  - (i) **Rock particles** : Tiny particles of soil derived from the parent rock.
  - (ii) **Humus** : This consists of decaying remains of plants and animals. It is found on the topmost layer of the soil. It is because of the humus that the soil becomes fertile. The humus is therefore, the organic matter of the soil.
  - (iii) **Living organisms** : Soil contains a large number of microorganisms like algae, bacteria, fungi and protozoa. Many small organisms like insects, earthworm, spiders, scorpions, centipedes and millipedes are also found in it. Burrowing animals like rats, moles, rabbits and guinea pigs make tunnels in the soil.
  - (iv) **Water** : This is present in pores between soil particles and helps plants in their growth.
  - (v) **Air** : Air is also present in the soil pores and is essential for the survival of living organisms present in the soil.
2. Refer to Q1 point (ii).
3. The scientists who study weather and climate are called meteorologists. A meteorologist may say climate is what you expect and weather is what you get.
4. **Differences between red soil and black soil:**

Red soil	Black soil
(i) It is formed by weathering of metamorphic rocks.	(i) It is formed by weathering of volcanic rocks.
(ii) It is red in colour due to presence of iron oxide.	(ii) It is black in colour due to presence of iron, potassium and magnesium.
(iii) It has less water retention capacity.	(iii) It has more water retention capacity.

5. The process by which soil formation takes place is called weathering. This process, initiated by the action of wind, running water, temperature rain, glaciers and many other natural events like violent earthquakes and volcanic eruptions.

Some factors that cause weathering of rocks, are described below:

- (i) **Temperature changes** : Rocks expand when heated and contract when cooled. The hot sun causes the surface layers of rocks to expand more than the layers deeper down. These changes cause adverse effect on rocks and hence leads to weathering.
- (ii) **Forest** : Rain water may become trapped in small crevices of the parent rock. In winter, this water freezes to ice. The ice expands producing a lateral pressure causing the crevices in the rocks to further open up.
- (iii) **Water** : Continuos movement of rain water and river water over smaller pieces of rock breaks them down further to form soil.
- (iv) **Wind** : Wind blowing across a rock surface has an abrasive effect on the rocks. It causes weathering. Minute rock particles are carried away by the blowing wind and deposited elsewhere.
- (v) **Living organisms** : Certain life forms like the lichens can grow on the surface of rocks. The lichens produce acids which corrode the rock surface causing weathering of rock. Due to weathering of rock fine particles are produced. Then, in these fine soil particles other organisms like microbes, algae insects and worms grow and die more soil is thus formed.

6. Distinction between the A-horizon and B-horizon of soil layers:

<b>A-horizon</b>	<b>B-horizon</b>
(i) It is the uppermost lager of soil.	(i) It is the next layer of soil.
(ii) It is the darkest in colour.	(ii) It is lighter in colour than the upper layer.
(iii) It is rich in humus.	(iii) It does not contain humus.
(iv) This layer is soft and porons.	(iv) This layer is harder and more compact then A-horizon.
(v) It is very fertile due to presence of humus.	(v) Very little organic matter is found, therefore, it is not fertile.

- 7. Loamy soil is best for ogricultur. It is suitable for the crops of wheat, rice, sugarcane, cotton, oilseeds, etc. Some characteristics of alluvial soil are given below:
  - (i) This soil is loamy in texture.
  - (ii) This soil contains plenty of humus.
  - (iii) It is very fertile due to presence of humus.
  - (iv) It holds sufficient water due to the presence of smaller particles.
  - (v) It contains enough air due to the presence of some large particles.
- 8. Soil is one of the important natural resources essential for the sustenance of life on this planet. However, it is under tremendous presssure from the human beings. Soil erosion means removal of topsoil. This is brought

about by wind and water or rain. There are several factors that allow water and wind to cause soil erosion. A few of them have been described below:

- (i) **Overgrazing** : Overgrazing by large animal populations has destroyed vegetation and resulted in barren lands. The barren lands do not hold water any more. In addition, barren lands are liable to erosion by strong winds.
  - (ii) **Poor farming methods** : Another factor contributing to soil erosion is the poor farming methods. Ploughing loosens the soil and destroys its natural structure. Failure to replace humus after successive crops reduces the water holding capacity of soil. The soil thus dries and is blown away by winds on sloping ground, such soil may be eroded by wind.
  - (iii) **Deforestation** : Deforestation that is removal of vegetation or removal of trees, allows water to run off the soil. Water does not seep down in the soil. Thus, soil particles are carried away by water from rains, etc. The problem is serious on steep slopes. The water carries soil particles into the rivers, which get choked with silt. The net result is the floods. Since deforestation makes the land barren, wind erosion too takes place. The root system of the plants binds the soil together as well as acts as a channel for water to percolate down, thereby, preventing erosion.
  - (iv) **Forest fires** : Forest fires lead to soil erosion. After fire, the soil is exposed to two main factors causing erosion namely wind and water.
9. Prevention of soil erosion can be brought about by controlling the factors which cause soil erosion. The methods are as follows:
- (i) To maintain the soil in its natural condition, it is advisable to grow different crops. Crop rotation as it is called, helps to maintain the fertility of the soil. The water holding capacity of the soil is also maintained by this method.
  - (ii) Proper drainage and irrigation arrangements should be made in the fields.
  - (iii) On the sloping areas in hills, strip cropping should be practised, thereby, reducing the steepness of the slopes and checking soil erosion.
  - (iv) Deforestation should be stopped rather trees should be planted (afforestation). Afforestation should be undertaken not only in areas already cut, but additional areas should be brought under plantation. Tree and grasses hold the soil in place.
  - (v) To reduce the effect of strong winds in the fields, the trees should be planted along the boundaries of the fields.
10. All animals are adapted to live in a particular habitat. This habitat is their home. The mountain goat and yak can live easily in the mountains while



the horse and cow prefer the flat land of the plains. Human beings find it easy to live on land while fish and whale can live only in water. All the features that help an organism to live in a habitat are called adaptations.

**B. Write short notes on the following topics :**

1. **Climate :** The average weather conditions at a specific place over a much longer period of time is termed as climate. Some elements namely temperature, pressure, winds, humidity and rainfall decide the kind of the climate. The climate of a region depends on :
  - (i) The presence or absence of water (rain fall)
  - (ii) Amount of sunshine it gets.
  - (iii) The ability to transfer water to the atmosphere.
  - (iv) The place whether it is a hilly or a plain region.In a desert, climate is hot while it is cold climate in the hilly areas.
2. **Desert soil :** It is soft and porous and cannot hold much water. It is not much good for crops. Such soil with good irrigation can produce wheat, rice, grapes and melons. It is found in Rajasthan. Some parts of Gujarat and South of Punjab.
3. **Clayey soil :** More than 50% of this soil contains clay particles. Since these particles are very small in size, they are very tightly packed and do not allow water to drain out easily. Clayey soil, therefore, gets easily waterlogged. It is poorly aerated because the tightly-bound clay particles leave little space for air. Clayey soil is very sticky and, thus, tilling it is very difficult. This soil is however, rich in mineral, which makes it suitable for plant growth. Due to the great binding capacity of its particles, clayey soil is used for making toys and pots.
4. **Role of climate in the formation of soil :** Climate plays an important role in the formation of soil. The elements of climate such as temperature, humidity and wind act as agents in the formation of soil. Soil is formed by the breaking down of large rocks over a long period of time. This process, initiated by the action of wind, rain, running streams, glaciers, alternate high and low temperatures and soil organisms is called weathering. Weathering forms more and more soil over the period.
5. **Water holding capacity of soils :** All types of soil usually contain water in the spaces present between the soil particles. The amount of water contained in a type of soil determines its water holding capacity. Absorption of water is important for the growth of plants. Plants grow better in soils which have better water-holding capacity. Clayey and loamy soils have a very good water-holding capacity. But loamy soils are better for the growth of plants. Clayey soil is sticky and badly aerated which is not so with loamy soil. Loam is a good mixture of sand, clay and humus. Since it has sufficient aeration, good water-holding capacity and humus, it is the best soil for growing crop.
6. **Deforestation :** Forest are a very important natural resource. Forests are renewable resource which are not only a valuable economic resource for

mankind, but are very important for maintaining the ecological balance of life on Earth.

The growing population needs space to live, fields to grow crop, etc. Thus large forest areas are cut by man. Cutting down the forests is known as *deforestation*. Deforestation has resulted in upsetting the natural eco-system with the following ill effects :

- (i) There is less rain, with the result there is a problem of drinking water and water for irrigation.
- (ii) The water table has gone down, with the result less or no underground water is available for human beings and animals.
- (iii) There is lot of soil erosion. Thus fertile soil is carried away by fast flowing water or strong wind.

Due to deforestation, we have a very complex problem at our hands, We must conserve and maintain forests.

7. **Crop rotation** : Soil is one of the important natural resource essential for the sustenance of life on this planet. To maintain the soil in its natural condition it is advisable to grow different crops. Growing different crops at intervals is known as *crop rotation*. Crop rotation helps to maintain the fertility of the soil. The water holding capacity of the soil is also maintained by this method.
8. **Hibernation** : Hibernation is a kind of winter sleep. In winters some animals go to 'sleep' or 'hibernate' in burrows or caves. Their body temperature go down. They breathe slowly and their heart also beats slowly. They get the required energy for survival from the fats stored in the body before winter. Such animals get up from their 'sleep' in early spring season.

**C. Fill in the blanks :**

- |                 |                   |               |
|-----------------|-------------------|---------------|
| 1. lit-up, dark | 2. Meteorologists | 3. Humus      |
| 4. loam         | 5. Desert soil    | 6. weathering |
| 7. groundwater  | 8. Deforestation  |               |

**D. Write the following incorrect sentences correctly :**

1. From mid summer until the end of the rainy season temperature decreases from North to South
  2. When rocks containing silicate minerals break down, they form clay particles which are much smaller than the sand particles.
  3. Alluvial soil is loamy in texture, has plenty of humus and is very fertile.
  4. Soil is formed by the breaking down of large rocks over a long period of time.
  5. A-horizon is the uppermost layer, darkest in colour, rich in humus and therefore is very fertile.
- (b) Climatic conditions such as drought can lower the level of water table which has a drastic effect on the growth of crops.

## CHAPTER 6. THE BREATH OF LIFE

### A. Answer the following questions :

1. Respiration is the process of taking in oxygen using it for release of energy by oxidation of food and eliminating the waste products—carbon dioxide and water. It is the more complicated process. It includes two main process. (i) breathing and (ii) oxidation of digested food with the release of energy.

(i) **Breathing** : The process by which organisms obtain oxygen from their surroundings and release carbon dioxide is called breathing. During breathing taking in of air rich in oxygen is called *inspiration* while the giving out of air rich in carbon dioxide is called *exparation*.

(ii) **Oxidation of digested food with the release of energy** : In this process digested food is oxidised with the release of energy within body cells. Chemical reaction that takes place giving out carbon dioxide along with water and energy can be summerised as follow :



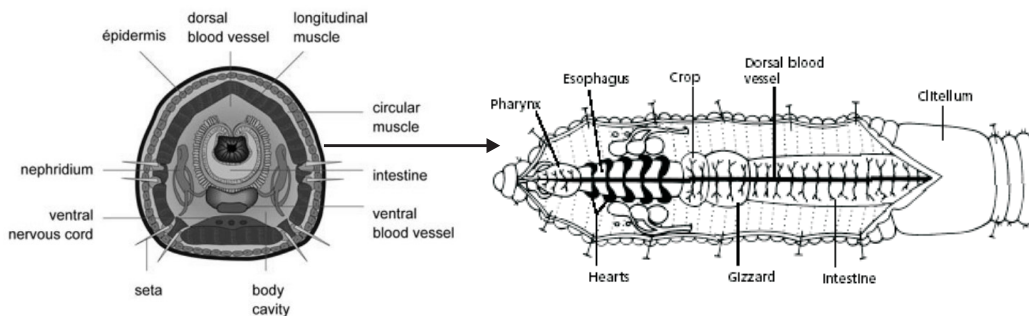
Glucose (a sugar), formed by the digestion of strach present in food is the main source of energy.

2. Respiration seems quite similar to the process of buring or combustion. This is because of the fact during respiration food is oxidised or burnt as a fuel to produce enerty. This resembles combustion, during the process of which a fuel is burnt to release energy.

3. In plants, the exchange of gases takes place by diffusion through small pores called stomata present in teh leaves and stem.

4. In earthworms, exchange of gases takes place by diffusion through the moist outer surface.

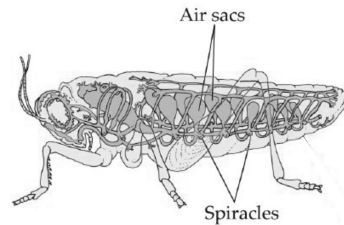
The thin, moist skin in earthworm is supplied with a network of capillaries (tiny blood vessels) wich absorb oxygen from the atmosphere and deliver it, to the rest of the body. The absorbing surface or the network of capillaries also get rid of carbon dioxide from the body.



Gaseous exchange in earthworm

5. Most of the species of insects exchange gases through openings called *spiracles* present on their bodies. The mode of their respiration is given below :

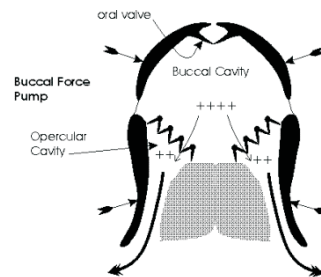
Air reaches the various parts and organs of an insect via an elaborate system of branching tubes called *tracheae*. The tracheae open up on the exterior body surface as spiracles. Large tracheal tubes run along and across the body. Smaller tracheae branch profusely from these larger ones finally forming tiny tubelets or tracheoles. Oxygen diffuse into the cells at the fine endings of the tracheal system. Carbon dioxide is carried out of the body by tracheoles too.



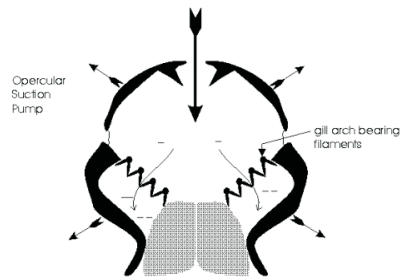
Gaseous exchange in insects

Grasshoppers and many other insects also have air sacs in their tracheae system. These air sacs functions during vigorous body movements, speeding up the movement of gases to and from the tissues.

6. Fish use *gills* for exchange of gases. Gills are made up of a large number of *filaments*, richly supplied with thin blood veins called *capillaries*. Filaments provide a very large surface to the water, that fish take in, for absorbing oxygen into the blood and getting rid of carbon dioxide. The mode of respiration in fish is discussed as under.



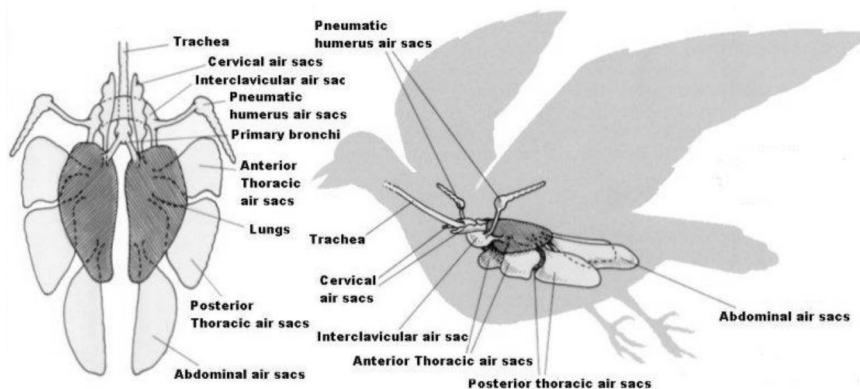
A fish gulps water through the mouth and forces it between the gills on each side of its head. As water flows across the gills, the oxygen in it gets diffused into the blood circulating in gills. At the same time, carbon dioxide in the bloodstream diffuses into the water and is carried out through a gap between the water in contact with the gills, so bringing fresh supplies of oxygen and carrying away carbon dioxide.



Gaseous exchange in fish

7. Birds have highly developed lungs where gaseous exchange takes place. The mode of respiration in birds is given below :

Air sacs and lungs constitute the respiratory system of birds. The lungs consist fine tubes, open at both ends. Here air is continuously ventilated from the extensive system of air sacs to the exterior. Gaseous exchange is very efficient, virtually no residual gas remains in the lungs tubes.

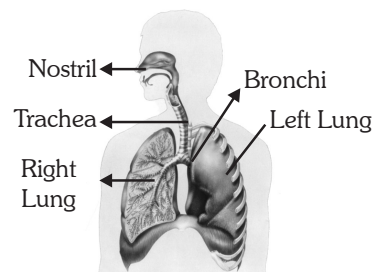


Gaseous exchange in birds

During inhalation all sacs fill with air, the posterior ones with air from the lungs. During exhalation air flows from the posterior sacs to the lungs, and from the anterior sacs to the exterior via the bronchus. Ventilation of the air sacs is driven by regular contraction and relaxation of muscles. During vigorous flights, contractions of the muscles enhance ventilation.

8. As the air passes through the nostrils, it is moistened by the slimy mucous present in the nose, Mucous is secreted by the inner lining of the nose. The air is warmed by the blood circulating in the nose. The mucous and the hair present inside our nose trap dirt, dust particles and disease-causing germs, and prevent them from entering the respiratory system.

9. **Respiration and gaseous exchange in human beings:** The human respiratory system consists of organs responsible for taking in oxygen for respiration and releasing carbon dioxide and water vapour, which are the waste products formed during respiration. The nostrils (the passages in the nose), trachea (windpipe), bronchi and lungs are the main organs of the respiratory system.



The Respiratory System

**Breathing in**

The air around us is not fit to enter our lungs. It should be moist, warm and clean. As the air passes through the nostrils, it is moistened by the slimy mucous present in the nose. Mucous is secreted by the inner lining of the nose. The air is warmed by the blood circulating in the nose. The mucous and the hair present inside our nose trap dirt, dust particles and disease-causing germs, and prevent them from entering the respiratory system. We do not get clean air if we breathe through our mouth instead of our nose. Therefore, we should always breathe through the nose. It will protect us from infection.

### To the lungs

From the nose cavity, the air passes through the pharynx or throat cavity to the windpipe or *trachea*. The windpipe branches into two smaller tubes called the *bronchi* (singular : bronchus). Each bronchus enters a lung.

### In the lungs

In the lungs, each bronchus branches out into smaller tubes called bronchioles. At the end of these tubes are tiny air sacs called alveoli. Each lung contains about 300 million alveoli. The air we breathe in eventually reaches these air sacs. The sacs are surrounded by blood vessels. The

oxygen present in the air we breathe in, goes into the blood contained in blood vessels. The carbon dioxide present in the blood (as a waste product of respiration) passes out of the blood into the air sacs. Thus, exchange of gases takes place in the lungs.

The blood takes the oxygen to all the cells of the body where it is used to get energy from food. The carbon dioxide released by the cells as waste goes back into the blood and is released into the air sacs of the lungs. It is then breathed out by us.

10. **Role of blood in respiration :** Blood is red because of the presence of a certain type of cells in it. These are the red blood cells. The red blood cells contain a pigment called haemoglobin. This pigment gives blood its red colour. Haemoglobin carries oxygen molecules as oxyhaemoglobin. This substance acts as a respiratory carrier in the body. Oxygen diffuses to the cells as blood passes through tissues. At the same time, the blood collects carbon dioxide from the tissues and carries it to the lungs for breathing out.

### B. Fill in the blanks :

1. inspiration      2. cells      3. subsidiary      4. surface  
5. air sacs, lungs      6. contractions      7. bronchi      8. oxyhaemoglobin

### C. Define the following :

1. **Expiration :** During breathing giving out of air rich in carbon dioxide is called expiration.
2. **Aerobic respiration :** Food in the form of glucose is oxidized in the presence of air to produce carbon dioxide and water along with release of energy, is called *aerobic respiration*. It is carried out in the bodies of almost all plants and animals.
3. **Anaerobic respiration :** Some organisms such as yeast and some bacteria can live without oxygen. In their cells glucose is broken into

Bronchiole      Alveoli (air sacs)



Bronchioles and alveoli in the lungs (magnified view)

alcohol and carbon dioxide without oxygen to give energy. This process is called anaerobic respiration.

**D. Differentiate between the following :**

**1. Differences between breathing and respiration :**

<b>Breathing</b>	<b>Respiration</b>
(i) It is a physical process involving exchange of O <sub>2</sub> and CO <sub>2</sub> .	(i) It is a biochemical process in which glucose is oxidized.
(ii) There is no release of energy.	(ii) Energy is released in this process.
(iii) Enzymes are not involved.	(iii) Enzymes are involved.
(iv) Modes of breathing are different in different organisms.	(iv) Details of respiration are similar in every living cells whether of plants or animals.

**2. Difference between respiration and burning :**

<b>Respiration</b>	<b>Burning</b>
(i) Takes place inside living cells.	(i) Takes place outside living cells.
(ii) Occurs at normal body temperature.	(ii) Requires high temperature.
(iii) Many steps are involved in the breakdown of food (which acts as fuel) to finally produce energy and let out carbon dioxide and water as byproducts.	(iii) Burning takes place spontaneously to convert fuel directly into carbon dioxide and release energy.
(iv) Various enzymes facilitate this process.	(iv) No enzymes are involved in this process.
(v) Respiration is a slow process of energy release.	(v) Burning is a fast process of energy release.

**3. Differences between aerobic and anaerobic respiration :**

<b>Aerobic respiration</b>	<b>Anaerobic respiration</b>
(i) Oxygen is required for this type of respiration.	(i) Oxygen is not required.
(ii) It occurs in all living organisms.	(ii) It occurs only in some bacteria, fungi, germinating seeds and certain animals tissues.
(iii) Complete oxidation of food occurs during the process.	(iii) Oxidation of food remains incomplete in it.

(iv) Oxidation of glucose produces carbon dioxide, water and energy.	(iv) Oxidation of glucose produces ethyl alcohol and carbon dioxide. It also produces some amount of energy.
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**E. Write ‘T’ for true and ‘F’ for false :**

1. T 2. F 3. T 4. F 5. T

**CHAPTER 7 : TRANSPORTATION AND EXCRETION**

**A. Answer the following questions:**

1. Circulatory system is a system that transports the materials like digested food, oxygen, carbon dioxide, excretory wastes and hormones from one region to another in all multicellular animals.
2. Heart acts as a pump in circulatory system. It sends the blood to the different regions of the body, through the blood vessels and also receives back the impure or the deoxygenated blood.
3. Arteries are thick walled tubes because they carry the oxygenated blood from the heart to different regions or organs and the blood flows in arteries with jerk and is at high pressure. The capillaries have thin walls so as to enable very tiny molecules to diffuse in and out.
4. Blood is a very vital components of our body. It is a connective tissue that circulates in our body.

**Composition of blood**

About 45% of a drop of blood consists of blood cells. These cells are of two types— the red blood cells and the white blood cells. The red blood cells are disc-shaped and contain a respiratory pigment called haemoglobin. The white blood cells are large, irregularly shaped cells. They are much bigger than red blood cells and fewer in number. The blood also contains platelets which are tiny fragments of cells. About 55% of blood is a pale yellow watery fluid called plasma. It consists mainly of water in which substances such as glucose; amino acids; ions of calcium, potassium, sodium, waste products and carbon dioxide are dissolved. Plasma also contains large protein molecules. There is also another fluid in blood that helps in circulation. It is called lymph.

5. **(i) Red blood Cells :** Red blood cells contain haemoglobin which combines with oxygen and transports it to all parts of the body.  
**(ii) White blood cells :** White blood cells fight with diseases. There are different types of white blood cells that attack bacteria, produce chemicals to stop virus infections, gather at a wound site to “eat up bacteria and germs” that try to enter inside body.  
**(iii) Platelets :** The platelets help the blood to form clots at a wound site so that excessive loss of blood may be prevented.
6. Blood takes oxygen from the air sacs of lungs that diffuses into the red blood cells and combines with haemoglobin. In the body tissues, there is



less oxygen in the cells in comparison to the blood. Thus, the oxygen splits from haemoglobin and diffuses into these cells. Carbon dioxide is produced during respiration by all cells. Plasma of the blood carries carbon dioxide of the blood to the lungs. In the air sacs of lungs, this gas diffuses into the air sacs out of the blood. Carbon dioxide diffuses in the opposite direction from oxygen.

7. Blood transfusion is a process of transferring blood to a patient. Blood deficiency due to a disease (anaemia) or arising from considerable loss from a severe injury or due to an operation may cause serious problems. If the blood is not compensated immediately, its deficiency may prove fatal. In that case, a need arises to transfer blood from a healthy person to a patient.
8. Water and minerals are absorbed from the soil by roots and transported to various parts of the plant, like stem, leaves and flowers. In the leaves, water is used for photosynthesis. Water and minerals absorbed from the soil move up to the leaves from roots through xylem tissues. Constant diffusion of water along with the minerals from the root cells produces a pushing force. Simultaneously water constantly evaporates from the leaves of a plant to form water vapour. This process is known as *transpiration*. This loss of water creates a pulling force, which causes more water to enter the roots and it is simply pulled up via the water conducting tissue vascular bundle.
9. The process of removal of unwanted waste substances is called *excretion*. The food that human beings and animals consume contains some vital nutrients required for the growth and proper functioning of human body. At the same time some toxic chemicals are also produced which have to be eliminated from the body. Not only toxic chemicals but waste gases and undigested food has to be removed from the body. Accumulation of toxic wastes in our body may be dangerous. It can make our body poisonous and cause much harm and in severe cases even death.
10. **Excretory system in humans :** Blood is the circulatory fluid which helps to transport useful and harmful products to the main excretory organ, *i.e.*, kidney. Kidneys are the bean shaped organs located on the either side of backbone. These help in filtration. Kidneys contain a group of blood capillaries which bring about this process. When the blood reaches the two kidneys it contains both useful and harmful substances. The useful substances are absorbed back into the blood whereas the unwanted substances are dissolved in water and are removed as urine. This urine passes through ureter and then collects in urinary bladder and gets excreted out through urethra.

**B. Write short notes on the following:**

1. *Heartbeat* The periodic contraction and relaxation of the heart is called the *heartbeat*. The normal human heartbeat is 70-72 per minute. The thumping sounds that we hear in our chest are heartbeats. Our heart beats

continuously throughout our life. Heartbeats can be heard more clearly and loudly using a stethoscope.

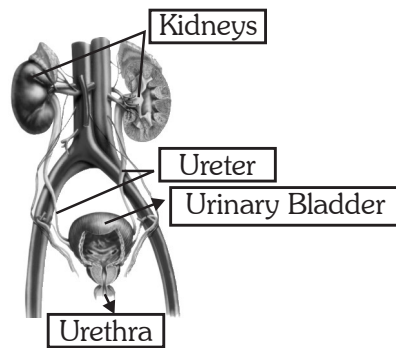
2. *Sphygmomanometer* is an instrument used to measure the pressure with which blood rushes through the veins in your body. The pressure is highest when the ventricles contract to pump the blood out. It is lowest when the ventricles relax to receive the blood.
3. **Blood groups** : There are four kinds of blood groups known as A, B, AB or O. The people with blood group 'O' are universal donor i.e., they may donate blood to any of the other blood groups. On the other hand, the people with blood group AB are universal recipient i.e., they may receive and accept blood from any of the other blood groups.
4. **Vascular tissue** : The special tissues present in the roots, stems and petioles of the leaves and are used for the transportation of materials such as water, minerals and food in plants are called vascular tissues. The term vascular in Latin refers to tubes and vessels that transport liquids. Soil is the reservoir of water and minerals for the plants. From the soil, roots of the plants absorb these dissolved minerals and water and then transport upwards to different parts of the plants (stem, leaves and flowers) through xylem tissues. Similarly, manufactured food in the leaves in the form of sugar (glucose) is transported to different parts of plants through phloem tissue. The xylem and phloem tissues together comprise the vascular bundle.
5. **Transpiration** : Transpiration is a process in which water constantly evaporates from the leaves of a plant to form water vapour. This loss of water creates a pulling force, which causes more water to enter the roots and it is simply pulled up via the water conducting tissue vascular bundle.
6. **Translocation** : The transportation of food from the leaves to the other parts of the plant is called *translocation*. Leaves produce food for the plant by the process of photosynthesis. The food is produced by leaves in the form of a simple sugar. The food produced by the leaves of a plant is transported to its other parts through a kind of tube system of the phloem cells. The movement of material through phloem depends on action of living cells called *sieve tubes*.  
Food molecules enter phloem cells from the food producing cells of the leaf. Once they enter phloem, they can be transported either upwards or downwards to all parts of the plants, including roots. The process of Translocation is essential because every part of the plant needs food for harnessing energy and for building and maintaining the organism.
7. **Dialysis** : A human being has two kidneys which work with same efficiency. If one kidney is damaged, then the other kidney is sufficient for excretory needs. But the damage of both kidneys would lead to death.  
When both kidneys fails, the person is treated periodically on a kidney machine by a procedure called *dialysis*. This machine is called *artificial kidney*.

Through the process of dialysis, waste products are removed from the body. When the kidneys are not functioning properly, these waste products build up and remain in the blood. As the quantity of these waste products rise in the blood, the patient becomes sick. Dialysis is a cleansing procedure that removes toxins and excess water from the blood (replacing the job the patient's kidneys were doing before they stopped functioning). This is necessary when the kidneys are no longer able to filter the waste products and remove the extra fluid that accumulates.

**C. Fill in the blanks :**

1. transportation      2. wastes      3. plasma      4. lymph
5. kidneys              6. blood group 'O'      7. transfusion
8. xylem, phloem

**D. Label the following picture :**



**E. Write the following incorrect statements correctly :**

1. Different animals adopt different methods of transportation of substances.
2. Heart sends blood to the different regions of the body.
3. Arteries carry the oxygenated blood from the heart to different regions or organs.
4. White blood cells are much bigger than red blood cells and fewer in number as compared to the red blood cells.
5. Blood regulate the body temperature by distributing heat equally in the different parts of the body.

**E. Name the following :**

1. Arteries      2. Veins      3. Carbon dioxide      4. Oxygen, water      5. Heartbeat.

**CHAPTER 8 : MULTIPLICATION IN PLANTS**

**A. Answer the following questions :**

1. Different kinds of asexual reproduction :
  - (i) Vegetative reproduction  
Example, A potato is swollen underground stem. The 'eyes' on the potato produce a new plant. Such a stem is called a tuber.
  - (ii) Grafting  
Example, Mango

- (iii) Cutting  
Example, Sugarcane
  - (iv) Budding  
Example, yeast
  - (v) Spore formation  
Example, Rhizopus
2. Vegetative reproduction is a method to form new plants in which neither two parents (male and a female) nor any special reproductive organs are involved but young ones may be obtained by planting leaves, stems and roots.

**Advantage of vegetative reproduction**

- (i) It is an easier, rapid and less expensive method of propagation.
  - (ii) Seedless plants can be raised.
  - (iii) Plants produced by this method are identical copies of the parent plant and show no variations.
  - (iv) Plants like banana sugarcane, sweet potato, rose and jasmine do not produce viable seeds. Such plants can be easily grown by this method.
3. Grafting is used to grow mango, lemon and rose plants.

**Method**

A small branch of plant is inserted into the stem of a rooted plant of the same type. The joint is covered by a layer of wax or clay. After a few days, the two become united and develop into a new plant.

The rooted plant with the root system under the soil is called as *stock*. The stem cutting of another desired plant is known as *scion*. The cells of the stem of the scion and the stock connect, with each other rapidly, as if they belonged to the same plant, This facilitated by the stock that supplies the desired nutrients to the scion.

4. **Reproduction in yeast :** Yeast reproduce by budding. If sufficient nutrients are made available to these tiny organisms they grow and multiply every few hours. During budding in yeast, a small bulb-like projection (protuberance) appears on the upper part of an adult cell. This projection is called a *bud*. This bud gradually grows and gets detached from the parent cell and forms a new yeast cell. The new yeast cell grows, matures and produces more yeast cells. If this process continues for some time then it results in the formation of a chain of yeast cells.
5. **Male and female reproductive organs :** In flower a stamen is the male reproductive part while the pistil is the female part. A stamen consists of an *anther* and a *filament*. An anther is a swollen structure present on the tip of the filament. The anther produces a powdery substance called the *pollen grains*. Pollen grains contain the male sex cell or gamete.
- A pistil consists of a basal swollen portion called the *ovary*. The ovary continues into a long *style* and ends in knob-like part, the *stigma*. The ovary contains many *ovules*. The female sex cell or gamete (egg) is present inside the ovule.

6. The transfer of pollen grains from anther to stigma is called pollination. There are two types of pollination :
- (i) **Self pollination** : The transfer of pollen grains from the anthers of a flower to the stigma of the same flower, or another flower of the same plant, is known as self pollination.
  - (ii) **Cross pollination** : The transfer of pollen from the anther of one flower to the stigma of another flower of a different plant of the same species is cross pollination.
7. (i) **Insect pollination** : The transfer of pollen grains from anther to stigma is called pollination. Some pollinators are required for the pollination. Insect is one of the pollinators. Insects visit flowers to collect *nectar*. These flowers are usually brightly coloured and have a strong scent to attract insects. When the insects reach a flower, they search for nectar. Pollens from the anther get rubbed on to the insect's back. An insect which has found nectar in one flower will visit flowers of the same kind to collect more nectar. As it pushes down into the next flower to reach the nectar, some of the pollens stuck to its body get rubbed on to the sticky stigma of the second flower. In this way, the second flower gets pollinated.
- (ii) **Wind pollination** : Flowers that are pollinated by wind are not brightly coloured. Grasses and cereals are some examples. Their sepals and petals are small but their anthers are long. They carry large number of pollens which are light in weight. These light pollens get blown by the wind easily. The stigmas are long and feathery and so they catch the pollens as they are carried by the breeze. These flowers are non-scented and do not contain nectar.
8. The fertilization leads to the formation of zygote. After the formation of the zygote, the petals, sepals and stamens wither away and fall off. Often the style and stigma also fall. Only the ovary remains. The ovules in the ovary contain a supply of food. The zygote takes in this food and begins to grow by cell division. In time it becomes an embryo. Meanwhile the walls of the ovules develop hard layers. Thus seeds, which consist of a young plant, with the stored food sealed within a hard layer. As the seeds form, the ovary begins to swell. In time it becomes a fruit. So, a fruit is actually a developed ovary. Some fruits, such as mangoes and apples, are sweet and juicy. Sometimes they become hard and woody forming the shells of nuts. A fruit can have one or more seeds inside it.
9. (i) In *Xanthium* the fruits are thorny and stick to our clothes as we pass by them. These fruits also stick to bodies of passing animals. Thus, animals as well as human beings help in dispersal.
- (ii) Coconut which is grown on the sea shore, the fruit is large and fibrous. It falls in water and is carried away from the parent plant by water currents.
  - (iii) In *madar*, the seeds are small and dry. A fine tuft of fine hair is present on the tip of each seed. These seeds are carried to far off places by wind.

