
FOCUS
ACADEMY
Std.: K.G. to 12 Com. Eng. & Guj. Medium

17. **Importance of pH in soil :** Plants require a specific pH range for their healthy growth.

→ The soil whose pH is between 6.5 to 7.3, the growth and development of shrubs is good.

→ The farmers add lime (CaO) to the acidic soil to neutralise it, while to neutralise basic soil, they add gypsum ($CaSO_4.2H_2O$) to the soil.

18. **Roasting :** In this method, the concentrated sulphide ore is heated in presence of excess of air for a long time. So metal sulphides ore oxidised to metal oxides. This method is known as roasting.

For example, $2ZnS(s) + 3O_2(g) \xrightarrow{\Delta} 2ZnO(s) + 2SO_2(g)$

Calcination : The ore containing metal carbonate is heated strongly in limited air to convert it into metal oxide. This process is known as calcination.

For example, $ZnCO_3(s) \xrightarrow{\Delta} ZnO(s) + CO_2(g)$

19. At the time, when Mendeleev classified elements and gave his periodic table, he left some gaps for the undiscovered elements. Thus, many scientists were inspired to discover the unknown elements.

→ Atomic masses of several elements were corrected on the basis of periodic table.

→ Inert gases such as helium (He), neon (Ne) and argon (Ar) had been used in many context. These gases were discovered very late because they are very inert and present in extremely low concentrations in atmosphere. Another strength of the periodic table was that, when these gases were discovered later, they could be placed in a new group named zero group without disturbing the existing order.

OR

9. **Variation in atomic radii in a period :** On moving fro left to right in a period, the atomic number of elemer increases successively by 1. Due to increased nuclear charg the attraction between electron and nucleus increases, henc the atomic size decreases.

→ Thus, on moving from left to right in a period, ther is a trend of decrease in atomic radii.

20. Bile is an alkaline digestive juice secreted from the live cells. Bile contains bile salts, certain bile pigments but doe not contain any digestive enzymes.

The bile salts turn the acidic food from stomach alkaline and thereby provide alkaline medium for furthe reactions in intestine. Bile salts emulsify the large fat globule into a very large number of very minute fat droplets an thereby greatly increase the exposed surface area of fat fo the rapid action of lipases.

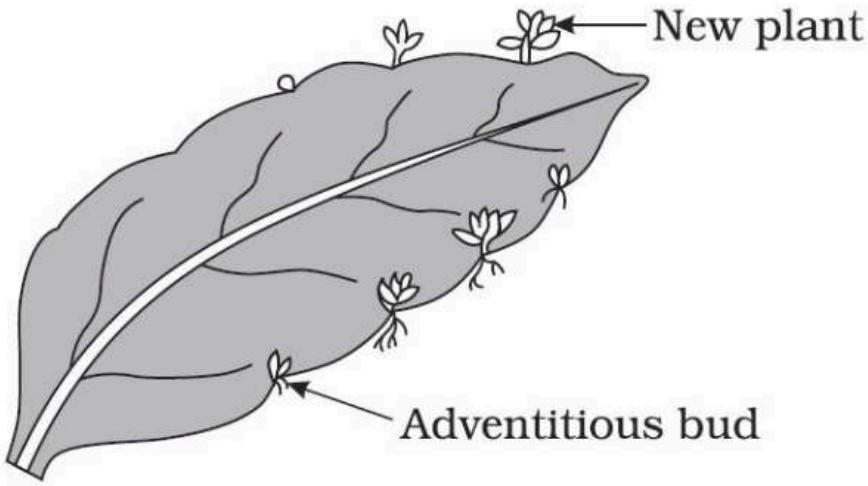
Hence, bile is an important digestive juice though does not contain any digestive enzymes.

OR

20. A deficiency of haemoglobin in our bodies leads to a diseas called anaemia.

Due to this, cells of our body do not get sufficien oxygen for cellular respiration, which may lead to releas less energy. Weakness, fatigue, tiredness, etc. condition may arise.

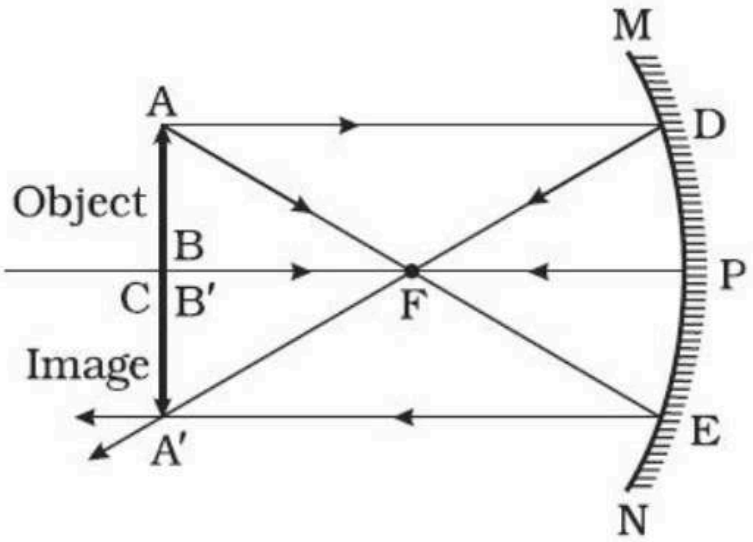
21. In Bryophyllum leaf, buds are produced in the notches alon the leaf margin. Such buds fall on the soil, germinate, an develop into new plants.



Sometime, bud develops in the notches along the lea margin and a new plant develops there only.

22. When an object is placed in front of a concave mirror a the centre of curvature C the image is formed at the same position (At centre of curvature C). The diagram showing this situation is as follows :

Position of the object : At centre of curvature C



Position of the image : At centre of curvature C

Nature of the image : Real and inverted

Size of the image : Same as that of the object

23. The resistance of a conductor depends on the followin factors :

(1) Length of the conductor l ($R \propto l$), (2) Area of cross section of the conductor A $\left(R \propto \frac{1}{A}\right)$, (3) Type of material the conductor (Means, electric resistivity of the material the conductor). (4) Temperature of the conductor. (Withi certain limit the resistance of the conductor increase with increase in temperature, while resistance decreases i semiconductor.)

OR

23. $V = 220\ \text{V},\ P = 100\ \text{W},\ V' = 110\ \text{V},\ P' = ?$

Resistance of the bulb $R = \frac{V^2}{P}$

$$= \frac{220 \times 220}{100} = 484\ \Omega$$

Now, Power P' used on connecting with $V' = 110\ \text{V}$ is $\frac{V'^2}{R}$

$\left(P' = \frac{V'^2}{R}\right)$

$$\therefore P' = \frac{110 \times 110}{484} = \frac{(22 \times 5)(22 \times 5)}{22 \times 22} = 25\ \text{W}$$

24. (1) A current can be induced in a coil by moving a magne towards or away from it or by moving the coil toward or away from the magnet.

(2) A current can be induced in a coil by changing th current in the coil placed near it.

(3) A current can be induced in a coil by moving a co properly in a non-uniform magnetic field or by changin a magnetic field around steady coil by some means.

(4) A current can be induced in a coil by rotating properly in a magnetic field or by rotating a magne properly placed near the coil.

25. Decomposers feed on the excretory substances as well a dead bodies of plants and animals.

Bacteria and fungi are decomposers.

→ They breakdown the complex organic substances int simple inorganic substances.

→ Such simple inorganic substances are used up by th plants again.

→ So, they play an important role in cyclic pathway of th elements.

26. Forest cover of the world is rapidly depleting. It is mor rapid in developing countries. The consequences are : rapidl increasing population, industrialization and urbanization Destruction of the forest is very rapid, particularly in th tropical region.

Serious effects of deforestation are as follows :

(1) It induces changes in the regional and global climate

(2) Due to the destruction of forests, the rainfall decreases

(3) Loss of forest cover causes increase in soil erosion and decrease in the fertility of land.

(4) Increase in the amount of CO_2 and temperature in th atmosphere. This leads to greenhouse effects.

(5) Due to loss of habitat of wildlife, chains of foodwel break. As a result of it many organisms becom endangered or extinct.

(6) The ecosystem balance is disturbed due to deforestation and irregularities arise in the functioning of biogeochemica cycles.

OR

26. Advantages of building the dams :

(1) Storage of adequate water ensure the water supply to crop field round the year for irrigation.

(2) The water from dams is used to generate electricity.

(3) To stop the flow of rain water to sea and help to control flood to some extent.

(4) Canal systems leading from the dams can transfer large amounts of water over great distance i.e., to semi-arid and arid regions.

Disadvantages of building the dams :

(1) Poor tribals loose their habitat.

(2) Agricultural land is submerged.

(3) Large ecosystem is lost.

(4) There is no equitable distribution of water. Due to it, people close to the source grow water intensive crops like rice, sugarcane, etc. while people farther downstream do not get any water.

[Write any **two advantages** and **two disadvantages**.]

27. Displacement reaction : Chemical reaction in which more reactive element displaces the less reactive element from its compound (solution) is called displacement reaction.

Examples :

(1) $Zn(s) + 2AgNO_3(aq) \longrightarrow Zn(NO_3)_2(aq) + 2Ag(s)$

Silver nitrate — Zinc nitrate

(2) $Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$

Copper sulphate — Iron sulphate

Double displacement reaction : Chemical reaction in which two reactants react by exchange of ions is called double displacement reaction.

Examples :

(1) $Na_2SO_4(aq) + BaCl_2(aq) \longrightarrow BaSO_4(s) + 2NaCl(aq)$

(2) $2KBr(aq) + BaI_2(aq) \longrightarrow BaBr_2(s) + 2KI(aq)$

28. The chemical properties of metals are as follows :

(1) Metals react with oxygen and form metal oxide.

$4Na + O_2 \longrightarrow 2Na_2O$

$2Mg + O_2 \longrightarrow 2MgO$

(2) Some metals react with cold water while some metals reacts with hot water and for hydrogen gas and metal hydroxide.

$2Na + 2H_2O \longrightarrow 2NaOH + H_2$

$Mg + 2H_2O \longrightarrow Mg(OH)_2 + H_2$

→ Metal like aluminium and iron do not react with cold or hot water, but react with steam (water vapour) and form their oxides and release hydrogen.

$2Al + 3H_2O \longrightarrow Al_2O_3 + 3H_2$

$3Fe + 4H_2O \longrightarrow Fe_3O_4 + 4H_2$

(3) Metals react with dilute HCl or dilute H_2SO_4 and produce hydrogen gas and form salts of metal.

$Mg + 2HCl \longrightarrow MgCl_2 + H_2$

$Fe + H_2SO_4 \longrightarrow FeSO_4 + H_2$

OR

28. Alloy : A homogenous mixture of two or more metals or metal and non-metal is known as an alloy.

Advantages of an alloy :

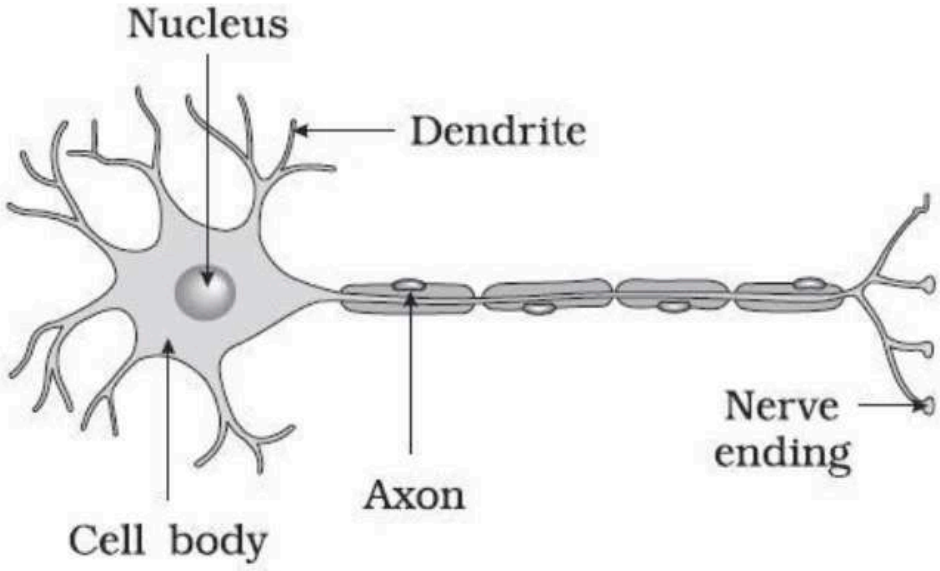
(1) By alloying, properties of metal can be improved and we can get desired properties in metal.
e.g., Pure iron is very soft. But, if it is mixed with a small amount of carbon (about 0.05 %) it becomes steel, which is hard and strong. Pure gold (24 carat) is soft, but 22 carat gold is an alloy of gold and copper, which can withstand against wear and tear.

(2) Iron gets rusted. But when iron is mixed with nickel and chromium we get stainless steel which is hard and does not get rusted.

(3) Copper becomes dull faster. But brass, an alloy of copper and zinc and bronze, an alloy of copper and tin do not become dull faster. Moreover they have attractive appereance.

Alloy	Components	Properties
(1) Brass	Copper and zinc	Attractive colour like gold
(2) Bronze	Copper and tin	→ Rust-proof → Attractive appereance
(3) Stainless steel	Iron, nickel and chromium	→ Rust-proof → Strong and shiny attractive alloy

29.



Function of neuron : The information of external stimulus is received at the end of the dendritic tip of the nerve cell. An electric impulse is generated by set of chemical reactions. This impulse travels from cell body to axom and finally reaches to nerve ending. The chemicals realeased at nerve ending cross the synapse and start a similar impulse in a dentrite of next neuron.

Thus, neuron is specialised to conduct information in the form of stimulation from one end to another.

30. The sexual act always has the potential to lead to pregnancy. There are many ways that have been devised to avoid pregnancy and thereby achieving population control.

(**1**) **Mechanical barrier :** By the use of it sperm does not reach the egg.

Condoms or similar barriers worn in the vagina can serve this purpose.

Other contraceptive Intrauterine Devices (IUD) such as loop or copper-T are placed in the uterus to prevent pregnancy. It may cause side effects due to irritation of the uterus.

(**2**) **Chemical methods :** In this method, contraceptive pills have to be taken orally by female.

→ The drugs in contraceptive pills change the hormonal balance of the female body. They can cause side-effects too.

(**3**) **Surgical methods :** If the vas deferens in the male is blocked, sperm transfer will be prevented. If the fallopian tube in the female is blocked, the egg will not be able to reach the uterus. In both cases fertilisation will not take place.

Surgical methods can be used for such blocks. While surgical methods are safe in the long run.

OR

31. (1) Mendel selected pea plant for experiments, the reasons are as follows :

→ They are small plants and can be easily grown.

→ They are annual plants. So there are more chances of studying more number of generations every year.

→ It produces a large number of offsprings.

→ Its flowers are bisexual and generally show self-fertilisation.

→ Artificially cross pollination can be done as and when required.

→ There are varieties of characters. Each character shows atleast two contrasting expressions.

(2)

Homologous organs	**Analogous organs**
1. The internal structure and fundamental origin of these organs are mostly similar.	1. The fundamental structure and origin of these organs are totally dissimilar.
2. Functionally these organs may be similar or dissimilar.	2. Functionally these organs are always similar.
3. The presence of these organs indicates common ancestors.	3. The presence of these organs does not indicate common ancestors.
4. The forelimbs of frog, lizard, bird and man are homologous organs.	4. The wings of butterfly, wings of birds and those of bat are analogous organs.

32. We wish to obtain an erect image of an object, using a concave mirror. So the object would be kept between pole and principle focus of the concave mirror. The focal length of the concave mirror is 15 cm.

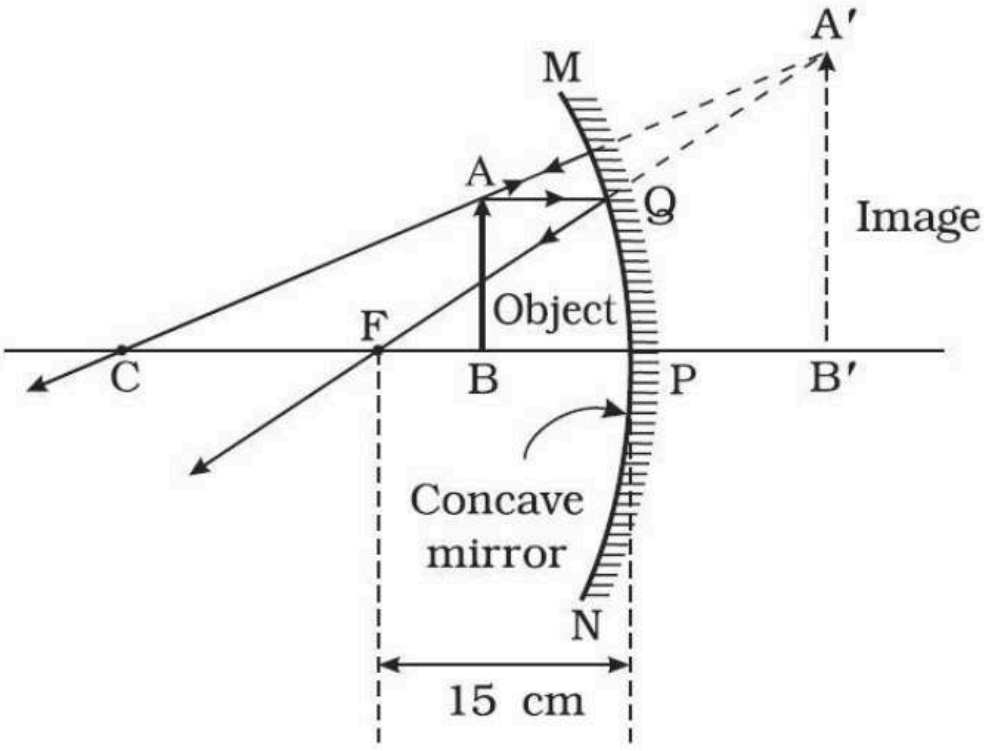
→ The range of distance of the object from the mirror : 0 to 15 cm

→ The image would be erect. So its nature : Virtual and erect

→ The virtual image obtained by the concave mirror is always larger than the object.

→ Size of image : Larger than the object

The ray diagram to show the image formation is as follows :



OR

2. (1)

Convex lens	Concave lens
1. It is thick at the centre and thin at the edges.	1. It is thin at the centre and thick at the edges.
2. It converges parallel rays incident on it.	2. It diverges parallel rays incident on it.
3. It forms a real or virtual image of an object depending on the position of the object.	3. It always forms a virtual image.
4. The virtual image obtained with it is always enlarged.	4. The virtual image obtained with it is always diminished.

[**Note :** Write any *three* points.]

(2) Uses of concave mirrors are as follows :

(1) Concave mirrors are used as reflectors in torches, search-lights, headlights of motor vehicles.

(2) Concave mirrors are often used as shaving mirrors / make-up mirrors to see a larger image of the face.

(3) Concave mirrors are used by the dentists to see large images of the teeth of patients.

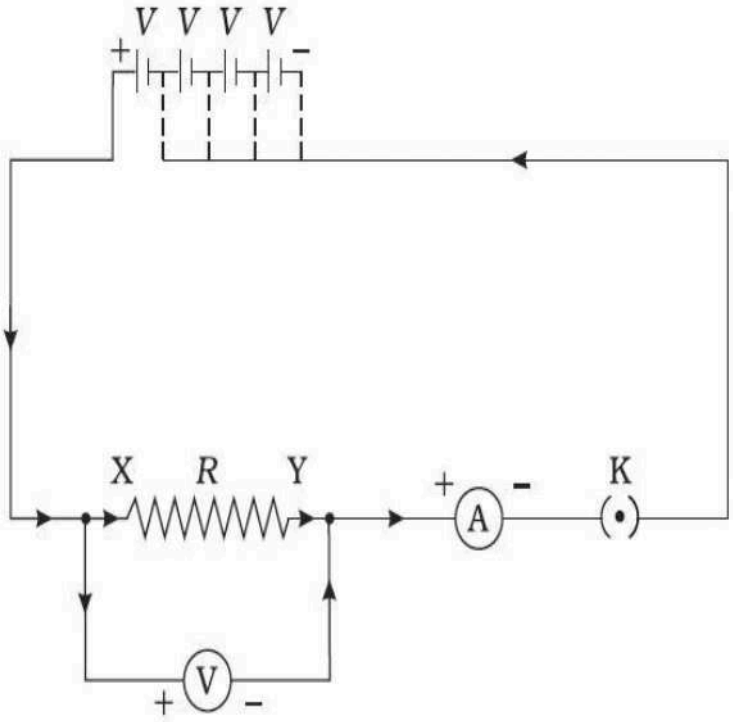
(4) Large concave mirrors are used to concentrate sunlight to produce heat in solar cookers, solar furnaces, etc.

(5) A concave mirror is used as a doctor's head mirror to focus light on the body parts like eyes, ears, nose, throat, etc. to be examined.

(6) Large concave mirrors are also used in reflecting telescopes.

[**Note :** Write any *three* uses.]

33. Aim : To verify Ohm's law.



Procedure :

(1) Set up a circuit as shown in figure, consisting of a Nichrome wire XY of length say 0.5 m, an ammeter, a voltmeter and four cells of 1.5 V each.

(2) First use only one cell as the source in the circuit.

Note the reading of ammeter I, for the current and reading of the voltmeter V for the potential difference across the Nichrome wire XY in the circuit.

Tabulate them in the Table given.

(3) Next connect two cells in the circuit and note the respective readings of the ammeter and voltmeter.

(4) Repeat the above steps using three cells and then four cells in the circuit separately.

→ Calculate the ratio V to I for each pair of potential difference V and current I.

→ Plot a graph between V and I and observe the nature of the graph.

Observation table :

Sr. No.	Number of cells used in the circuit	Potential difference across the Nichrome wire V (volt)	Current through the Nichrome wire I (ampere)	$\frac{V}{I}$ (volt / ampere)
1.	1	1.5	0.1	15
2.	2	3	0.2	15
3.	3	4.5	0.3	15
4.	4	6	0.4	15

Observation : When V increases I also increases linearly, i.e., $I \propto V$. The ratio V/I is found to be (approximately) the same, i.e., 15 V/A.

The graph between V and I is a straight line passing through the origin O.

Conclusion : The electric current flowing through a metallic wire is directly proportional to the potential difference across its ends ($I \propto V$) and V/I is a constant ratio in particular case.

34. In a process in which nucleus of a heavy atom (such as uranium, plutonium or thorium) can be split into lighter nuclei when bombarded with low-energy neutrons is called nuclear fission. A tremendous amount of energy is released. During this, if the mass of the original nucleus is just a little more than the sum of the masses of the individual products.

The fission of an atom of uranium produces 10 million times energy produced by the combustion of an atom of carbon from coal.

Nuclear fuel releases energy at a controlled rate through self sustaining fission chain reaction in a nuclear reactor designed for electric power generation. The released energy can be used to produce steam and further generate electricity.

35. Preparation of baking soda :

(1) When carbon dioxide gas (CO_2) and ammonia (NH_3) gases are passed through an aqueous solution of sodium chloride, baking soda is formed.

$$NaCl(aq) + H_2O(l) + CO_2(g) + NH_3(g) \longrightarrow NH_4Cl(aq) + NaHCO_3(aq)$$

Ammonium chloride — Sodium hydrogen carbonate (Baking soda)

(2) By passing carbon dioxide gas through an aqueous solution of sodium carbonate, baking soda can be obtained.

$$Na_2CO_3(aq) + H_2O\,(l) + CO_2(g) \longrightarrow 2NaHCO_3(aq)$$

Chemical name of baking soda is sodium hydrogen carbonate or sodium bicarbonate.

Uses of baking soda : (1) For making baking powder. (2) It makes bread, cake or pakoras soft and spongy. (3) As an antacids. (4) It is used in soda-acid fire-extinguishers. (5) As a reagent in laboratory.

OR

35. **(1)** There are five water atoms in one unit formula of copper sulphate. ($CuSO_4 \cdot 5H_2O$)

The crystals of copper sulphate appear of blue colour due to presence of these water molecules. Now, if crystals of copper sulphate are heated, then water molecules are removed. As a result it loses crystal form and it become colourless powder.

(2) **Uses of H_2 :** (1) In preparation of ammonia, (2) In hydrogenation of vegetable oil (preparation of vegetable ghee), (3) As a fuel.

Uses of Cl_2 : (1) To make drinking water germ-free, (2) In preparation of bleaching powder, (3) In preparation of PVC.

→ 5 – 8 % solution of ethanoic acid in water (aqueous solution) is called vinegar.

→ Ethanoic acid is a weak acid; but hydrochloric acid is a strong acid as it ionises completely.

Uses of ethanoic acid :

→ In the preparation of vinegar, which is used to add sour taste to food items.

→ It is used as food preservator to preserve the food for long time.

→ As a solvent and reagent in laboratory.

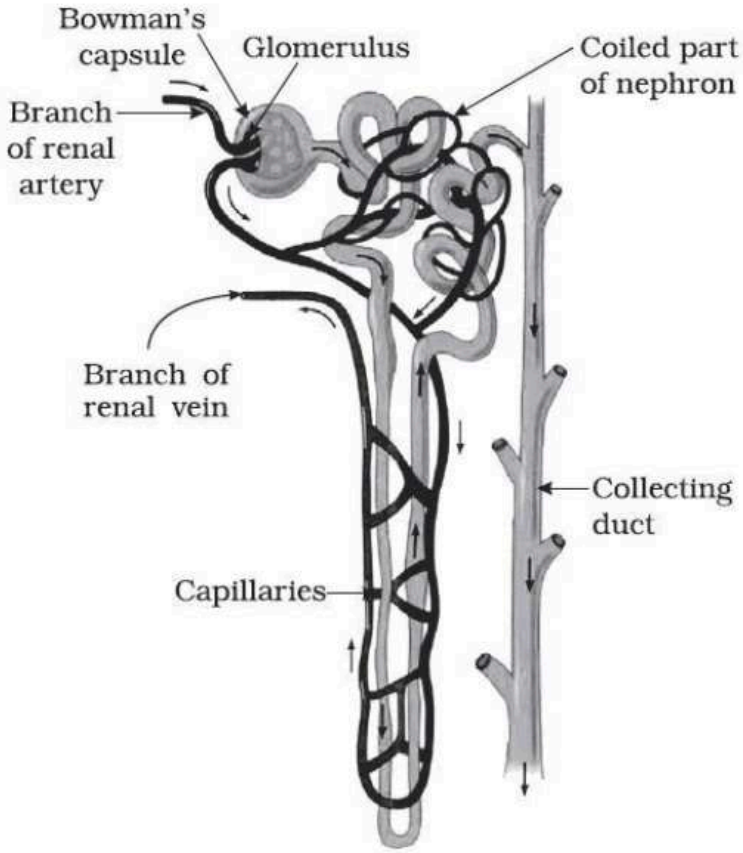
→ It is used to prepare lead white (pigment).

37. Nephron is a basic filtration unit in the kidneys.

→ Each kidney has large numbers of nephrons packed closely together.

→ Nephron is a long-coiled tubular structure which begins with a cup-shaped end, called **Bowman's capsule** and it ends in collecting tubule.

→ A cluster of very thin-walled blood capillaries seen in the Bowman's capsule is called glomerulus.



38. Atmospheric refraction is the phenomenon of bending of light passing through the earth's atmosphere.

→ The earth is surrounded by a layer of air called the atmosphere. The density of air in the atmosphere is not the same everywhere. The hotter air is lighter (less dense) than the cooler air (more dense) above it.

→ In general, density is highest at the earth's surface and goes on decreasing as we move higher.

→ The refractive index of air depends on its density. The lower the density of air, the lower is its refractive index.

→ Thus, the upper layers of the earth's atmosphere are optically rarer as compared to the lower layers.

→ Thus, light coming from the Sun and stars passes through a medium (air) of continuously increasing refractive index before it reaches the observer on the earth and hence its direction of propagation continuously changes.

→ Since the physical conditions of the refracting medium (air) are not stationary, the apparent position of an object as seen through the hot air fluctuates continuously.

This wavering is thus an effect of atmospheric refraction (refraction of light by earth's atmosphere) on small scale in our local environment.

Some phenomena based on atmospheric refraction are :

(1) Twinkling of stars

(2) Advance sunrise, i.e., the sunrise is observed two minutes earlier than the actual sunrise.

(3) Delayed sunset, i.e., the sunset is observed two minutes later than the actual sunset.

(4) Stars seem higher than they actually are.

(5) The sun appears oval at the sunrise and sunset, but appears circular at noon.

39. Electromagnetic induction : The process, by which a changing magnetic field in a conductor induces a current in another conductor is called electromagnetic induction. **OR**

An electric current produced in a closed circuit by a changing magnetic field is called an induced current. This phenomenon is called electromagnetic induction.

(1) The galvanometer will show a momentary deflection in one direction. It means a current is induced in the coil in one direction due to the relative motion between the coil and the magnet.

(2) The galvanometer will show a momentary deflection in the opposite direction. It means a current is induced in the coil in the opposite direction due to the relative motion between the coil and the magnet.

(3) There will be no deflection in the galvanometer. It means no current is induced in the coil, as there is no relative motion between the coil and the magnet.

[**Note :** The greater the speed of the magnet, the greater is the deflection of the pointer in the galvanometer.]

OR

39. (**1**) **Short-circuiting :** If the plastic insulation of the live wire and neutral wire gets torn, then the two wires come in contact either directly or via a conducting wire. This thouching of the live wire and neutral wire is known as short-circuiting.

In this case, the resistance of the circuit becomes almost zero. This results in the flow of large current in the circuit. This heats up the wire dangerously and may lead to fire.

(**2**) **Overloading :** The current flowing in domestic wiring at a particular time depends on the power ratings of the appliances being used. If too many electrical appliances of high power rating e.g., electric iron, water heater, air-conditioner, etc. are switched on at the same time, they draw an extremely large current from the circuit. This is called overloading.

Therefore the copper / aluminium wires of household wiring get heated to a very high temperature. This can lead to fire.

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