

Karnataka Board Class 10 Science

(Physics, Chemistry, Biology) Solved Previous Year Question-2019

Four alternatives are given for each of the following questions / incomplete statements. Only one of them is correct or most appropriate. Choose the correct alternative and write the complete answer along with its letter of alphabet.

$10 \times 1 = 10$

1. The change that occurs in the eye to see the distant objects clearly is

- (A) Focal length of the eye lens decreases
- (B) Curvature of the eye lens increases
- (C) Focal length of the eye lens increases
- (D) Ciliary muscles of the eye contract

Answer: (C) Focal length of the eye lens increases

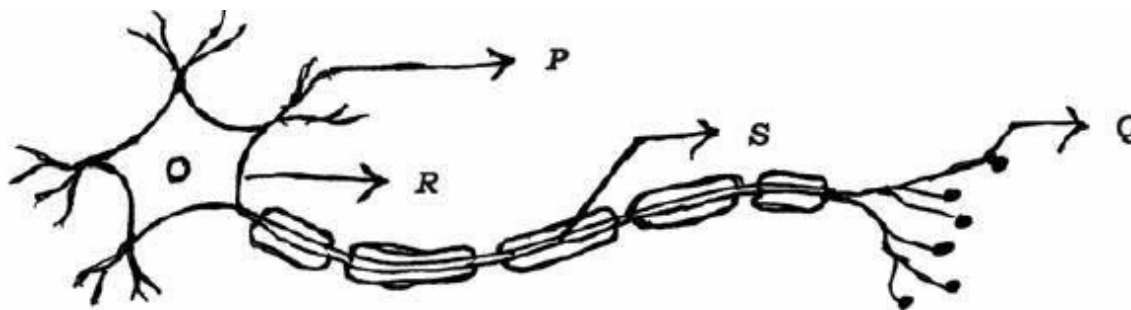
Explanation: The eye lens is composed of a fibrous, jelly-like material. Its curvature can be modified to some extent by the ciliary muscles and this change in the curvature of the eye lens can thus change its focal length. When the muscles are relaxed, the lens becomes thin. Thus, its focal length increases. This enables us to see distant objects clearly.

2. The functional groups present in propanol and propanal respectively are

- (A) — OH and — CHO
- (B) — OH and — COOH
- (C) — CHO and — COOH
- (D) — CHO and — CO

Answer: (A) — OH and — CHO

3. The correct path of the movement of nerve impulses in the following diagram is



- (A) $Q \rightarrow S \rightarrow R \rightarrow P$
- (B) $P \rightarrow Q \rightarrow R \rightarrow S$
- (C) $S \rightarrow R \rightarrow Q \rightarrow P$
- (D) $P \rightarrow R \rightarrow S \rightarrow Q$

Answer: (D) $P \rightarrow R \rightarrow S \rightarrow Q$

4. The resistance of a conductor is $27\ \Omega$. If it is cut into three equal parts and connected in parallel, then its total resistance is

- (A) $6\ \Omega$
- (B) $3\ \Omega$
- (C) $9\ \Omega$
- (D) $27\ \Omega$

Answer: (B) $3\ \Omega$

Given that $R = 27\ \Omega$

Then $R/3 = 27/3 = 9\ \Omega$ each

Therefore $R_1 = R_2 = R_3 = 9\ \Omega$

In parallel connection, total resistance is given as the formula below:

$$1/R_{eq} = 1/R_1 + 1/R_2 + 1/R_3 = 1/9 + 1/9 + 1/9 = 3/9 = 1/3$$

$$1/R_{eq} = 1/3$$

Hence, $R_{eq} = 3\ \Omega$

5. The chemical equation that represents neutralization reaction among the following is:

- (A) $\text{BaCl}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{BaSO}_4 + 2\text{HCl}$
- (B) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
- (C) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- (D) $\text{AgNO}_3 + \text{HCl} \rightarrow \text{AgCl} + \text{HNO}_3$

Answer: (C) $2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$

The reaction between an acid and a base to give a salt and water is known as a neutralisation reaction. So here, we have 2NaOH as base and H_2SO_4 (Sulphuric Acid) as acid, which gives Na_2SO_4 (Salt) and $2\text{H}_2\text{O}$ (water).

6. By constructing Khadin check-dams in level terrains,

- (A) underground water level decreases
- (B) underground water level increases
- (C) vegetation in the nearby areas are destroyed due to excess moisture
- (D) underground water gets polluted

Answer: (B) underground water level increases

In largely level terrain, the water harvesting structures are mainly crescent shaped earthen embankments or low, straight concrete-and rubble “check dams” built across seasonally

flooded gullies. Monsoon rains fill ponds behind the structures. Only the largest structures hold water year round; most dry up six months or less after the monsoons. Their main purpose, however, is not to hold surface water but to recharge the ground water beneath.

7. To obtain a diminished image of an object from a concave mirror, position of the object should be

(F = principal focus, C = centre of curvature, P = pole)

- (A) between C and F**
- (B) beyond C**
- (C) between P and F**
- (D) at F**

Answer: (B) beyond C

You will see in the above Activity that the nature, position and size of the image formed by a concave mirror depends on the position of the object in relation to points P , F and C . The image formed is real for some positions of the object. It is found to be a virtual image for a certain other position. The image is either magnified, reduced or has the same size, depending on the position of the object. If the position of the object is beyond C and the image is between F and C , then the size of the image is diminished and nature of the image is real and inverted.

8. The electronic configuration of element X is 2, 8, 8, 1 and the electronic configuration of element Y is 2, 8, 7. Then the type of bond formed between these two elements is

- (A) covalent bond**
- (B) hydrogen bond**
- (C) metallic bond**
- (D) ionic bond**

Answer: (D) ionic bond

Elements forming ionic compounds achieve this by either gaining or losing electrons from the outermost shell. In this X has one electron outside, which is added to the element Y to form ionic bond.

9. Part of the flower that develops into fruit and part of the seed that develops into root respectively are

- (A) ovary and plumule**
- (B) plumule and radicle**
- (C) ovary and radicle**
- (D) ovary and ovule**

Answer: (C) Ovary and radicle

Swollen bottom part of the Pistil (female reproductive part) is the ovary that contains ovules and each ovule has an egg cell. The male germ-cell produced by pollen grain fuses with the

female gamete present in the ovule resulting in the zygote, which is capable of growing into a new plant.

Meanwhile, the radicle also known as the embryonic root of the plant is the first part of a seedling (a growing plant embryo) to emerge from the seed during the process of germination. It grows downward in the soil (the shoot emerges from the plumule).

10. A pure dominant pea plant producing round — yellow seeds is crossed with pure recessive pea plant producing wrinkled — green seeds. The number of plants bearing round — green seeds in the F_1 generation of Mendel's experiment is

- (A) 0
- (B) 1
- (C) 3
- (D) 9

Answer: (A) 0

Only dominant trait is seen in F_1 generation and dominant trait in this case is round and yellow seeds. So the number of plants bearing round-green seeds in F_1 generation of Mendel's experiment is 0.

11. The functions of hormones are given in Column-A and the names of the hormones are given in Column-B. Match them and write the answer along with its letters: $4 \times 1 = 4$

Column - A	Column - B
Prepares the body to deal with the situation	Growth hormone
Regulates metabolism for body growth	Testosterone
Regulates blood sugar levels	Adrenaline
Regulates the growth and development of the body	Progesterone
	Insulin
	Thyroxine
	Oestrogen

Answer:

Column - A	Column - B
Prepares the body to deal with the situation	Adrenaline
Regulates metabolism for body growth	Thyroxine
Regulates blood sugar levels	Insulin
Regulates the growth and development of the body	Growth hormone

Adrenaline prepares the body to deal with the situation. Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth. Insulin regulates blood sugar level. Growth Hormone stimulates growth in all organs.

Answer the following questions.

7 × 1 = 7

12. Name the acid present in the stinging hair of nettle leaves

Answer: Nettle is an herbaceous plant which grows in the wild. Its leaves have stinging hair, which cause painful stings when touched accidentally. This is due to the methanoic acid secreted by them.

13. What are fossils?

Answer: Fossils are the preserved traces or impression of the body parts of living organisms retained from a past geological age. Usually, when organisms die, their bodies will decompose and be lost. But every once in a while, the body or at least some parts may be in an environment that does not let it decompose completely. If a dead insect gets caught in hot mud, for example, it will not decompose quickly, and the mud will eventually harden and retain the impression of the body parts of the insect.

14. Convex mirror is commonly used as rear-view mirror in vehicles. Why?

Answer: Convex mirrors are commonly used as rear-view (wing) mirrors in vehicles. These types of mirrors are preferred because they always give an erect, though diminished, image. Also, they have a wider field of view as they are curved outwards. Thus, convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.

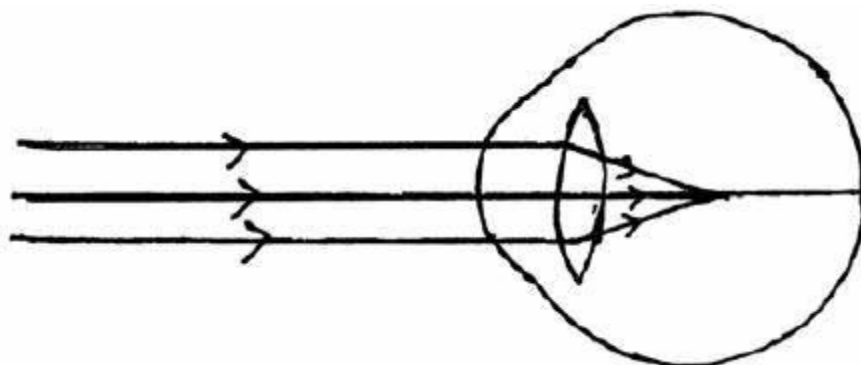
15. What is roasting in metallurgy?

Answer: The metals in the middle of the activity series such as iron, zinc, lead, copper, are moderately reactive. These are usually present as sulphides or carbonates in nature. The sulphide ores are converted into oxides by heating strongly in the presence of excess air. This process is known as roasting. The chemical reaction that takes place during roasting of zinc ores are given:

Roasting



16. Observe the given figure. Name the eye defect indicated in the figure and also mention the lens used to correct this defect.



Answer: The eye defect indicated in the figure is Myopia, also known as near-sightedness. A person with myopia can see nearby objects clearly but cannot see distant objects distinctly. In a myopic eye, the image of a distant object is formed in front of the retina and not at the retina itself. This defect may arise due to (i) excessive curvature of the eye lens, or (ii) elongation of the eyeball. This defect can be corrected by using a concave lens of suitable power. A concave lens of suitable power will bring the image back on to the retina and thus the defect is corrected.

17. What is Tyndall effect?

Answer: The phenomenon of scattering of light by the colloidal particles gives rise to Tyndall effect. This phenomenon is seen when a fine beam of sunlight enters a smoke-filled room through a small hole. Thus, scattering of light makes the particles visible. Tyndall effect can also be observed when sunlight passes through a canopy of a dense forest. Here, tiny water droplets in the mist scatter light.

18. Under what condition lactic acid is produced in the muscle cells?

Answer: Formation of lactic acid in muscles transpires when insufficient oxygen is supplied to the muscles, causing the release of energy via anaerobic cellular respiration instead of by aerobic cellular respiration.

Answer the following questions.

16 × 2 = 32

19. Draw the diagram of an electric circuit in which the resistors R_1 , R_2 and R_3 are connected in parallel including an ammeter and a voltmeter and mark the direction of the current.

Answer:

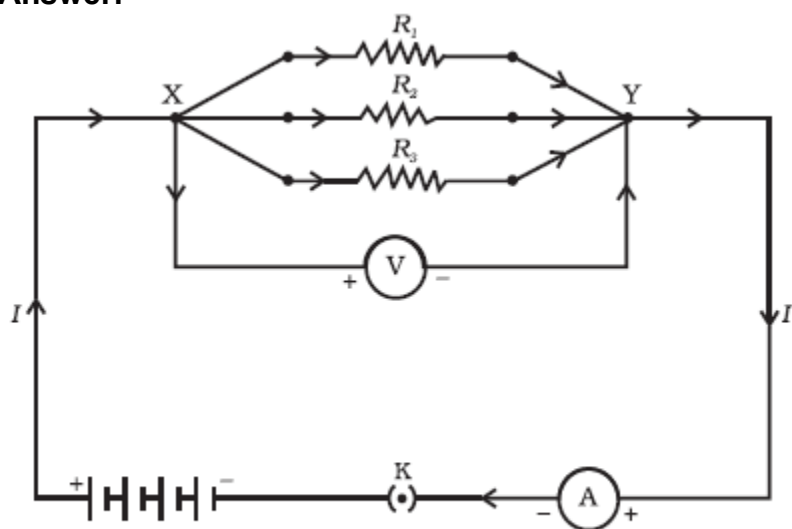
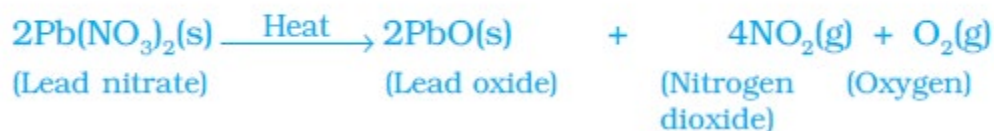


Figure 12.7 Resistors in parallel

20. Name the brown fumes liberated when lead nitrate is heated. Write the balanced chemical equation for this reaction.

Answer: Take about 2 g lead nitrate powder in a boiling tube. Hold the boiling tube with a pair of tongs and heat it over a flame. You will observe the emission of brown fumes. These fumes are of nitrogen dioxide (NO_2). The balanced chemical equation for the reaction that takes place is given below:



21. Explain the process of translocation of food materials in plants.

Answer: Transport of soluble products of photosynthesis is called translocation and it occurs in the part of the vascular tissue known as phloem. Besides the products of photosynthesis, the phloem transports amino acids and other substances. The translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions. Unlike transport in xylem which can be largely explained by simple physical forces, the translocation in phloem is achieved by utilising energy. Material like sucrose is transferred into phloem tissue using energy from ATP, thus increasing the osmotic

pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure according to the plant's needs.

OR

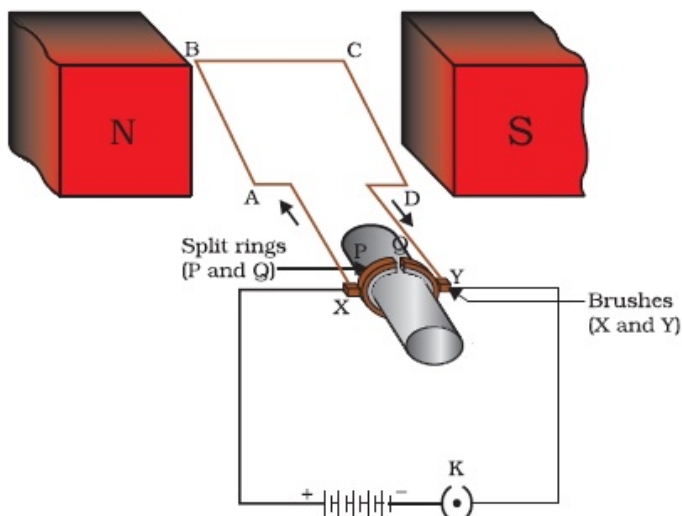
21. Explain the process of digestion in the small intestine of man.

Answer: In human beings, the food eaten is broken down by various steps along the alimentary canal and the digested food is absorbed in the small intestine to be sent to all cells in the body. The small intestine is the site of the complete digestion of carbohydrates, proteins and fats. It receives the secretions of the liver and pancreas for this purpose. The food coming from the stomach is acidic and has to be made alkaline for the pancreatic enzymes to act. Bile juice from the liver accomplishes this in addition to acting on fats. Fats are present in the intestine in the form of large globules which makes it difficult for enzymes to act on them. Bile salts break them down into smaller globules increasing the efficiency of enzyme action. Meanwhile, the pancreas secretes pancreatic juice which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats. The walls of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the proteins to amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

22. Draw the diagram of a simple electric motor. Label the following parts:

- (i) Split rings
- (ii) Brushes.

Answer:



23. What are structural isomers? Name the first member of alkanes that shows structural isomerism.

Answer: The compounds with identical molecular formula but different structures are called structural isomers. The first member of the alkane that shows structural isomerism is butane with chemical formula C_4H_{10} . The Complete molecules for two structures with formula C_4H_{10} are also given below:



24. Draw the diagram showing the longitudinal section of a flower. Label the following parts:

- (i) Style.
- (ii) Anther.

Answer:

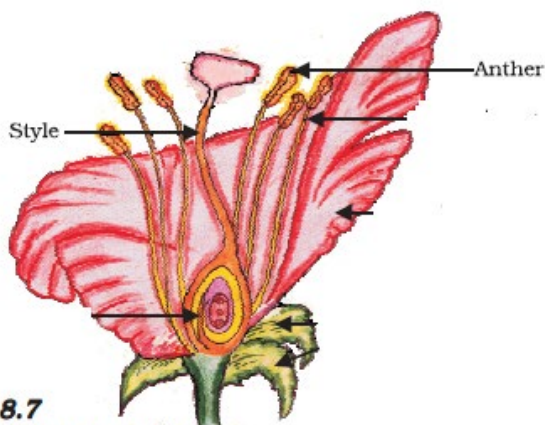


Figure 8.7
Longitudinal section of
flower

25. Draw the diagram of arrangement of apparatus used to show the reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning. Label the following parts.

- (i) Soap solution
- (ii) Delivery tube.

Answer:

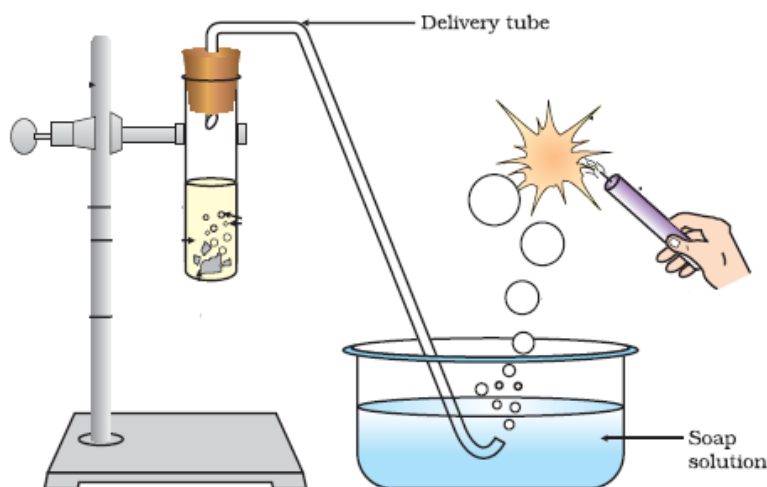


Figure 2.1 Reaction of zinc granules with dilute sulphuric acid and testing hydrogen gas by burning

Acids, Bases and Salts

26. It is advantageous to connect electric devices in parallel instead of connecting them in series. Why?

Answer: Advantages of connecting electric devices in parallel instead of connecting them in series are as follows:

It is obviously impracticable to connect an electric bulb and an electric heater in series, because they need currents of widely different values to operate properly. Another major disadvantage of a series circuit is that when one component fails the circuit is broken and none of the components works. On the other hand, a parallel circuit divides the current through the electrical gadgets. The total resistance in a parallel circuit is decreases, hence a greater current may be drawn from the cell. This is helpful particularly when each gadget has different resistance and requires different current to operate properly.

OR

26. According to Joule's law of heating, mention the factors on which heat produced in a resistor depends. According to this law write the formula used to calculate the heat produced.

Answer: Joule's law implies that heat produced in a resistor is (i) directly proportional to the square of current for a given resistance, (ii) directly proportional to resistance for a given current, and (iii) directly proportional to the time for which the current flows through the resistor. According to the law the formula used to calculate the heat produced is $H = I^2 R t$.

27. List the disadvantages of using fossil fuels.

Answer: The fossil fuels are non-renewable sources of energy, so we need to conserve them. The fossil fuels, coal and petroleum, will ultimately be exhausted. Because of this and because their combustion pollutes our environment, we need to use these resources judiciously. Burning fossil fuels has other disadvantages too. Results in air pollution caused by burning of coal or petroleum products. The oxides of carbon, nitrogen and sulphur that are released on burning fossil fuels are acidic oxides. These lead to acid rain which affects our water and soil resources. In addition to the problem of air pollution, recall the green-house effect of gases like carbon dioxide.

Or

27. List the advantages of 'reduce' and 'reuse' to save environment.

Answer: Reduce means that you use less resources. You save electricity by switching off unnecessary lights and fans. You save water by repairing leaky taps. At the same time, reuse is better than recycling because the process of recycling uses some energy. In the 'reuse' strategy, you simply use things again and again. Instead of throwing away used envelopes, you can reverse it and use it again. The plastic bottles in which you buy various food-items like jam or pickle can be used for storing things in the kitchen. Meanwhile, the benefits to 'reduce' and 'reuse' to save environment are as follows:

- Prevent pollution caused by reducing the need to harvest new raw materials
- It helps to save energy and money
- Reduces greenhouse gas emissions that could contribute to global climate change
- Helps sustain the environment for future generations
- Reduces the amount of waste that will need to be recycled or sent to landfills and incinerators
- Allows products to be used to their fullest extent]

28. The focal length of a concave lens is 30 cm. At what distance should the object be placed from the lens so that it forms an image at 20 cm from the lens?

Answer:

For the concave lens, f is given as 30cm and v as 20cm. Then $u = ?$

Lens formula gives the relationship between object-distance (u), image-distance (v) and the focal length (f). The lens formula is expressed as:

$$1/v - 1/u = 1/f$$

$$\text{Hence, } 1/f = 1/v - 1/u$$

$$1/u = 1/v - 1/f$$

$$1/u = 1/20 - 1/30$$

$$1/u = 1/60$$

$$u = 60 \text{ cm}$$

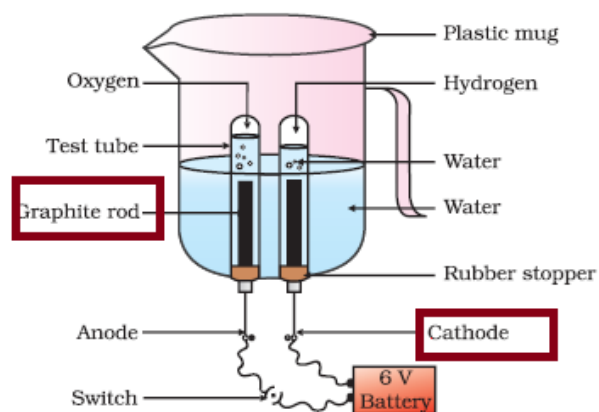
Hence, the object should be placed at a distance of 60cm.

29. Draw the diagram of the apparatus used in the electrolysis of water. Label the following parts.

(i) Graphite rod

(ii) Cathode.

Answer:



30. Growth of thread like structures along with the gradual spoilage of tomato can be observed when a cut tomato is kept aside for four days. Interpret the causes for this change.

Answer: Tomato contains large amount of pH and water, which makes them more susceptible to spoilage by the action of various microorganisms like Salmonella. Once these pathogens get attached to the surface of a cut tomato, they start secreting polysaccharide fibres resulting in the formation of biofilm, which enhances their ability to survive even under unfavourable environmental conditions.

31. An electric refrigerator rated 400 W is used for 8 hours a day. An electric iron box rated 750 W is used for 2 hours a day. Calculate the cost of using these appliances for 30 days, if the cost of 1 kWh is Rs. 3/-.

Answer: The total energy consumed by the refrigerator in 30 days would be
 $400\text{ W} \times 8.0\text{ hour/day} \times 30\text{ days} = 96000\text{ W h}$
 $= 96\text{ kW h}$

Thus the cost of energy to operate the refrigerator for 30 days is
 $96\text{ kW h} \times \text{Rs } 3.00\text{ per kW h} = \text{Rs } 288.00.$

Consequently, the total energy consumed by the electric iron box is
 $750\text{ W} \times 2.0\text{ hour/day} \times 30\text{ days} = 45000\text{ W h}$
 $= 45\text{ kWh}$

Thus the cost of energy to operate the refrigerator for 30 days is
 $45\text{ kW h} \times \text{Rs } 3.00\text{ per kW h} = \text{Rs. } 135$

32. There is no change in the colour of red litmus and blue litmus paper when introduced into an aqueous solution of sodium chloride. After passing direct current through the same solution, red litmus changes to blue colour. Which product is responsible for this change? Mention any two uses of this product.

Answer: Acids are sour in taste and change the colour of blue litmus to red, whereas, bases are bitter and change the colour of the red litmus to blue. When electricity is passed through an aqueous solution of sodium chloride (called brine), it decomposes to form sodium hydroxide, which is a base and gives the colour blue to the red litmus. Sodium hydroxide is used to degrease metals, manufacture soaps, detergents, papers, artificial fibres and more.

33. A food chain in a polluted aquatic ecosystem is given. Observe it and answer the following questions.

Fresh water \rightarrow Algae \rightarrow Fishes \rightarrow Birds.

(i) Which organisms are disturbed more due to bio magnification? Why?

(ii) This ecosystem will be destroyed gradually due to bio magnification. Why?

Answer: The chemicals and toxins which are released into the water bodies disrupt the food chain. The small organisms absorb the toxins which are eaten up by larger animals. These toxins, thus, get accumulated in the higher level of organisms. So, we can conclude that Birds are the organisms that are most disturbed due to bio magnification. Biomagnification refers to the accumulation of toxic substances in the food chain. The toxic chemicals that are released into the environment are absorbed by the lower organisms such as plants, earthworms, etc. These chemicals are then transferred to different trophic levels when lower organisms are eaten by other organisms. The pesticides and chemicals such as DDT, and

mercury released into the lakes and rivers are ingested by the aquatic organisms. These get accumulated in their body tissues and are transferred to other organisms that feed on them. Since the pesticides are industrially processed they contain traces of heavy metals such as lead, arsenic, cadmium, etc. These metals have been found in the bodies of animals and humans and are believed to have an adverse effect on them.

Or

33. A student places a piece of cucumber, a glass piece, a banana peel and a plastic pen in a pit and closes it. What changes can be observed in these materials after a month? Give scientific reason for these changes.

Answer: The changes that can be observed after a month when a banana peel, cucumber, pen and glass are placed in a closed pit are:

The cucumber and banana peel will disappear as these are natural products that are biodegradable. So, these will decompose and mix with the soil in the pit. Meanwhile, objects like the pen and glass will remain the same. This is because these are made from substances that are non-biodegradable in nature.

34. What is dispersion of light? Mention the colour that bends the least and the colour that bends the most when light undergoes dispersion through a prism.

Answer: The dispersion or scattering of white light when it passes through a glass prism into its constituent spectrum of colours (i.e. violet, indigo, blue, green, yellow, orange and red) is called 'Dispersion of Light.' Dispersion also mean distribution and during the process, the white light splits into its constituent colours at various frequencies and various angles. In a spectrum, violet bends the least and red bends the most during refraction while passing through prism. This happens due to variation of wavelengths of different colours, i.e., the VIBGYOR which constitutes white light. Wavelength increases from red to violet.

Or

34. Mention any four phenomena that can be observed due to atmospheric refraction of light on the earth?

Answer: 1. Blue colour of sky

2. Twinkling of stars

3. Position of stars

4. Advanced sunrise delayed sunset

Answer the following questions:

5x3=15

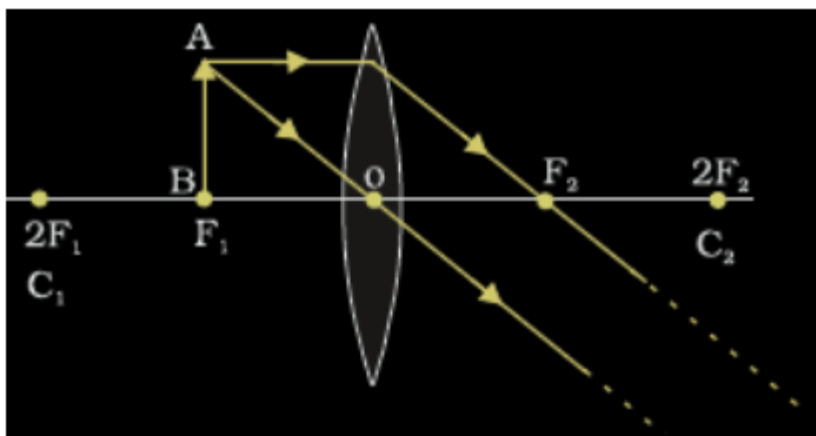
35. Draw the ray diagrams for the image formation in a convex lens when an object is placed

(i) at focus 1F.

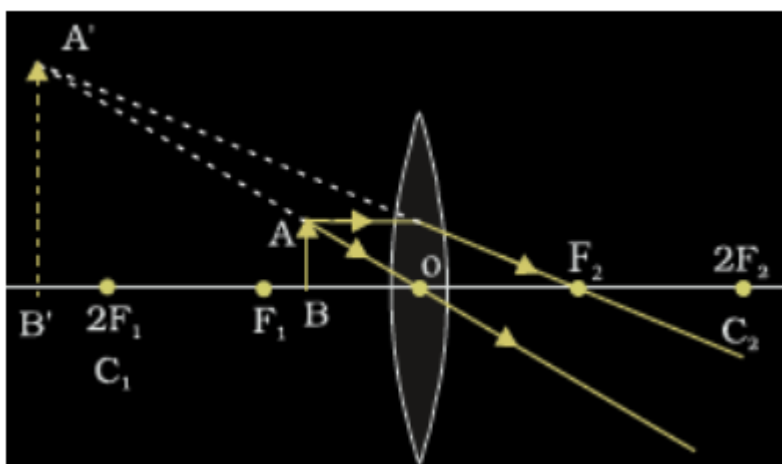
(ii) Beyond 2F.

Answer:

(i)



(ii)



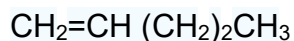
36. (i) Write the difference between saturated and unsaturated hydrocarbons?

Answer: Hydrocarbons are organic compounds that contain only carbon and hydrogen atoms. As per the presence of single or multiple bonds between carbon atoms, hydrocarbons are classified into two groups namely; saturated hydrocarbons and unsaturated hydrocarbons. The main difference between saturated and unsaturated hydrocarbon is that saturated hydrocarbons contain only single covalent bonds between carbon atoms, whereas unsaturated hydrocarbons contain at least one double or triple covalent bond in the main chain. Saturated and unsaturated hydrocarbons show different characteristics because of these structural differences.

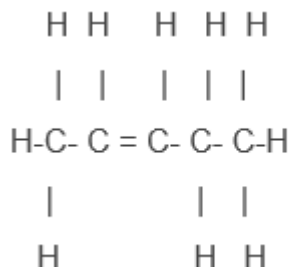
(ii) Write the molecular formula and structural formula of alkene having five carbon atoms.

Answer: The molecular formula of alkene having 5 carbon atoms are as follows

C₅H₁₀. At the same time, the structural formula for the alkene is also given:



Or



(i) Carbon atom does not form C⁴⁻ anion and C⁴⁺ cation. Why?

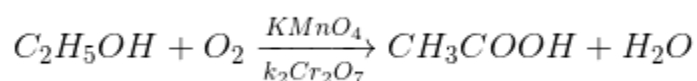
Answer: Carbon already has four electrons in its outermost shell and it needs to gain or lose 4 electrons to attain noble gas configuration. Carbon would have to gain 4 electrons forming C⁴⁻ anion. But, it would be difficult for the nucleus with 6 protons to hold on to 10 electrons, that is 4 extra electrons. It could also lose 4 electrons forming C⁴⁺ cation. However, it would require a large amount of energy to remove 4 electrons, thus leaving behind a carbon cation with 6 protons in its nucleus holding on to only 2 electrons.

Or

(ii) How can ethanol be converted into ethanoic acid?

Answer: Ethanoic Acid (CH₃COOH), an acetic acid is formed by oxidising ethanol. One of the best oxidising agent used for this purpose is an acidic solution of potassium permanganate. Alcohol is first converted to an acetaldehyde (ethanol) and then to the required carboxylic acid.

Ethanoic acid can be derived from ethanol by treating it with alkaline KMnO₄ or acidified K₂Cr₂O₇ and heating it. Ethene is converted into ethane by hydrogenation using nickel as a catalyst.



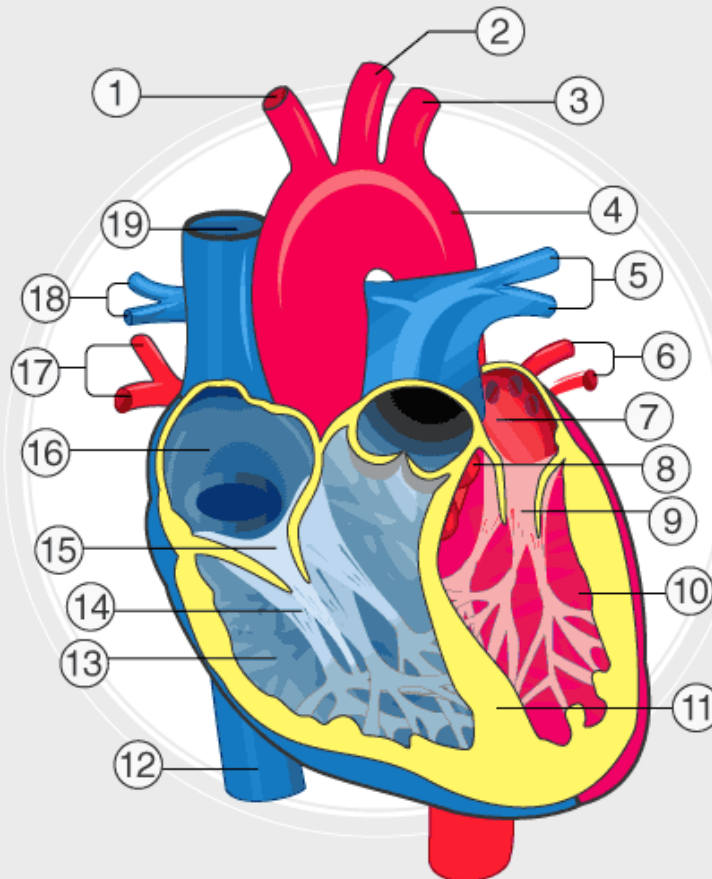
37. Draw the diagram showing the sectional view of the human heart. Label the following parts.

(i) Aorta

(ii) Chamber of the heart that receives deoxygenated blood.

Answer:

STRUCTURE OF THE HUMAN HEART



- | | | | |
|---------------------------|------------------------------|--------------------------|-----------------------|
| 1 Brachiocephalic Artery | 2 Left Common Carotid Artery | 3 Left Subclavian Artery | 4 Aorta |
| 5 Left Pulmonary Arteries | 6 Left Pulmonary Veins | 7 Left Atrium | 8 Semilunar Valves |
| 9 Atrioventricular Valve | 10 Left Ventricle | 11 Septum | 12 Inferior Vena Cava |
| 13 Right Ventricle | 14 Chordae Tendineae | 15 Atrioventricular | 16 Right Atrium |
| 17 Right Pulmonary Veins | 18 Right Pulmonary Arteries | 19 Superior Vena Cava | |

38. (i) Name the major constituent of biogas. Write the properties of biogas which make it a good fuel.

Answer: Biogas is a renewable energy source produced by the breakdown of organic matter by certain bacteria under anaerobic conditions. It is a mixture of methane, hydrogen, and carbon dioxide and can be produced by agricultural waste, food waste, animal dung, manure, and sewage. Biogas recycles the waste products naturally and converts them into useful energy, thereby, preventing any pollution caused by the waste in the landfills, and cutting down the effect of the toxic chemicals released from the sewage treatment plants. Biogas converts the harmful methane gas produced during decomposition, into less harmful carbon dioxide gas.

(ii) Name the two devices that work using heat energy of the sun.

Answer: Solar Cookers and Solar Water Heaters are two devices that work using heat energy of the sun.

OR

(i) Write the advantages of solar cells.

Answer: One of the main advantages associated with solar cells are that they have no moving parts, require little maintenance and work quite satisfactorily without the use of any focussing device. Another advantage is that they can be set up in inaccessible and remote hamlets or very sparsely inhabited areas in which laying of a power transmission line may be expensive and not commercially viable. Artificial satellites and space probes like Mars orbiters use solar cells as the main source of energy.

(ii) Write any two hazards of nuclear power generation.

Answer: The key hazard of nuclear power generation is the storage and disposal of spent or used fuels – the uranium still decaying into harmful subatomic particles (radiations). Improper nuclear-waste storage and disposal result in environmental contamination. Additionally, there is a risk of accidental leakage of nuclear radiation, as well. The high cost of installation of a nuclear power plant, limited availability of uranium and high risk of environmental contamination makes large-scale use of nuclear energy prohibitive.

39. Observe the given table and answer the following question:

Elements	A	B	C	D	E
Atomic Numbers	11	4	2	7	19

Identify the two elements that belong to the same period and the two elements that belong to the same group. Give reason for your conclusion.

Answers: Elements present in any one group have the same number of valence electrons. Same ways, atoms of different elements with the same number of occupied shells are placed in the same period. A and E are in the same group while B and D are in the same period.

In order to find the group and period write the electronic configuration for each:

A- 2, 8, 1

B- 2, 2

C- 2

D- 2, 5

E- 2,8,8,1

Elements that have the same number on the last shell are in the same group. For example A and E both have one electron on the last shell. Also, elements with the same number of shells are in the same period. For example B and D, which has two shells are both in Period 2.

Answer the following questions.

3 × 4 = 12

40. (i) How does overload and short-circuit occur in an electric circuit? Explain. What is the function of fuse during this situation?

Answer: A fuse in a circuit prevents damage to the appliances and the circuit due to overloading. Overloading can occur due to an accidental hike in the supply voltage. Sometimes overloading is caused by connecting too many appliances to a single socket. Overloading can also occur when the live wire and the neutral wire come into direct contact. (This occurs when the insulation of wires is damaged or there is a fault in the appliance.) In this scenario, the current in the circuit abruptly increases. This is called short-circuiting. The use of an electric fuse prevents the electric circuit and the appliance from a possible damage by stopping the flow of unduly high electric current. The Joule heating that takes place in the fuse melts it to break the electric circuit.

(ii) Mention two properties of magnetic field lines.

Answer: Magnetic field lines are the imaginary line used to represent magnetic field. Given below are some of the characteristics. Magnetic field lines do not intersect each other and the relative strength of magnetic field lines is given by the degree of closeness. The direction of the magnetic lines are indicated by arrows in the line at any point. The direction of field line inside the magnet is from south to North Pole, while the direction of lines outside the magnet is from north to South Pole.

41. Give reason:

(i) Ionic compounds in solid state do not conduct electricity, whereas in molten state are good conductors of electricity

Answer: The conduction of electricity via a solution involves the movement of charged particles. A solution of an ionic compound in water contains ions, which move to the opposite electrodes when electricity is passed through the solution. Meanwhile, ionic compounds in the solid state do not conduct electricity because there is no movement of ions in the solid due to their rigid structure. However, ionic compounds conduct electricity in the molten state. This is possible in the molten state since the electrostatic forces of attraction between the oppositely charged ions are overcome due to the heat. Thus, the ions move freely and conduct electricity.

(ii) Silver articles when exposed to air gradually turn blackish.

Answer: This is because silver reacts with sulphur present in the atmosphere and forms silver sulphide. This layer of silver sulphide on the metal makes it appear black and dull.

(iii) Chemical reaction does not take place when copper is added to iron sulphate solution.

Answer: If a single replacement (displacement) reaction has to occur, the metal in the reactants must be more reactive than the metal in the compound in the reactants. A metal can only replace (displace) a metal that occurs below it in the reactivity series. Iron is placed above copper in the activity series. Elements placed above in this series are more reactive than those placed below them. Thus, iron is more reactive than copper. Since, copper is below iron in the reactivity series, it is less reactive than iron and therefore unable to displace the ferrous ion (Fe^{2+}) in iron sulphate solution. Hence, the reaction between copper and ferrous sulfate will not occur because copper is less reactive than iron.

OR

Give reason:

(i) "Alloys of iron are more useful when compared to pure iron."

Answer: Alloys of iron are a mixture of nickel and iron. Pure iron will rust more easily than its alloy. Hence, the alloys of iron are more useful.

(ii) Copper loses its brown layer gradually when exposed to air.

Answer: Copper loses its brown layer gradually when exposed to air, because it becomes oxidised and copper oxide is formed.

(iii) Aluminium oxide is called amphoteric oxide.

Answer: Aluminum oxide (Al_2O_3) reacts with acids and bases to produce the corresponding salt and water.

42. (i) Write the differences between homologous organs and analogous organs.

Answer: Structures with similar anatomy, morphology, embryology and genetics but dissimilar functions are known as homologous structures. Structures that are superficially similar but anatomical dissimilar doing the same function are known as analogous structures.

Homologous vs Analogous Structures

Homologous Structure	Analogous Structure
Similar anatomy	Dissimilar anatomy
Dissimilar functions	Similar Functions
Inherited from a common ancestor	Not inherited from ancestors
Develops in related species	Develops in unrelated species
A result of divergent evolution	A result of convergent evolution
Developed as a result of the adaptation to a different environment	Developed as a result of the adaptation to a similar environment
An arm of a human, the leg of a dog or a flipper of a whale are all homologous structures	From wings in birds, bats and insects to fins in penguins and fishes are all analogous structures

(ii) Write the differences between the sex chromosomes of man and sex chromosomes of woman.

Answer: Chromosomes are a thread like structure holding genetic information and is present in the cell nuclei. A normal cell contains 23 pairs (46n) of chromosomes. Out of these, the last pair (2n) is sex chromosomes. Sex chromosomes are denoted as X and Y. Females typically have two of the same kind of sex chromosome (XX), and are called the homogametic sex. Males typically have two different kinds of sex chromosomes (XY), and are called the heterogametic sex. The X chromosome resembling a large autosomal chromosome have a long and a short arm. The Y chromosome, meanwhile has one long arm and a very short second arm. Other differences include number of genes, the number of working genes on the

chromosome and even abnormal chromosome pairings. The X chromosome contains more than 1,000 working genes, and the Y chromosome has less than 100 working genes. X chromosome is a sex chromosome that occurs paired in the female and single in the male. Meanwhile, Y chromosome is a sex chromosome that is normally present only in male cells. X chromosomes contain genes for female sex determination and Y chromosome contain genes for male sex determination. The X chromosome is bigger (about 155 million base pairs). Y chromosome is smaller (about 59 million base pairs). X chromosome does not contain the *SYR* gene, even as Y chromosome contains the *SYR* gene, which is involved in the development of the testes.

(iii) Sex of a child is determined by the father. How?

Answer: In human beings, the sex of the individual is to a large extent determined genetically. In other words, the genes inherited from the parents will decide whether the child will be a boy or a girl. Most human chromosomes have a maternal and a paternal copy, and there are 22 such pairs. However one pair, called the sex chromosomes, is odd in not always being a perfect pair. Women have a perfect pair of sex chromosomes, both called X. However, men have a mismatched pair in which one is a normal-sized X while the other is a short one called Y. So women are XX, while men are XY. Now, let us see how to determine the sex of a child. All children will inherit an X chromosome from their mother regardless of whether they are boys or girls. Thus, the sex of the children will be determined by what they inherit from their father. A child who inherits an X chromosome from her father will be a girl, and one who inherits a Y chromosome from him will be a boy.