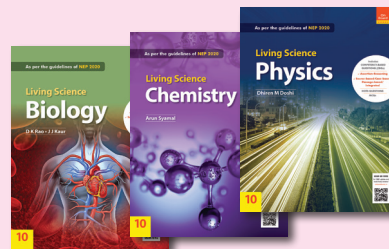


Sample Question Paper

2022-23



Class X SCIENCE (086)

ANSWERS

SECTION – A

- | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|
| 1. d. | 2. c. | 3. c. | 4. d. | 5. d. | 6. b. | 7. d. |
| 8. a. | 9. d. | 10. c. | 11. b. | 12. a. | 13. d. | 14. c. |
| 15. a. | 16. b. | 17. b. | 18. c. | 19. a. | 20. d. | |

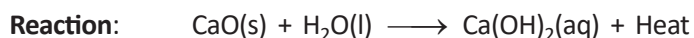
SECTION – B

21. a. The substance X is lime water which is the aqueous solution of calcium hydroxide.



When lime water reacts with carbon dioxide gas, it turns milky in colour due to the formation of calcium carbonate.

- b. Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide) releasing a large amount of heat.



OR

- a. We have seen food getting contaminated and having an unpleasant smell if it is left open in summer. In hot weather, oil present in food gets oxidised and becomes rancid. Such food is not recommended for consumption. The food is getting oxidised so the reaction is an oxidation reaction.
- b. Methods for preventing food from getting oxidised are
- Food is kept in a cool place like a refrigerator.
 - Packaging should be airtight.
 - Antioxidants should be added to food.
22. Brain is divided into three main regions forebrain, midbrain and hindbrain.
- Forebrain** consists of the cerebrum, olfactory lobes and diencephalon. Its main function is thinking and controlling various activities such as touch, smell, hearing, etc.
 - Midbrain** controls reflex movements of the head, neck, and trunk in response to visual and auditory stimuli.

- iii. **Hindbrain** has three centers called pons, cerebellum and medulla. This part is responsible for regulating respiration, maintaining posture and balance of the body, and controlling involuntary actions such as heartbeat, breathing, etc.
23. When attached to the plants, the grapes are living, that can perform aerobic respiration. Fermentation can occur in anaerobic condition. The microbes can grow in the plucked grapes, which can be fermented under anaerobic conditions.
- Fermentation is a chemical change as a new substance is formed in this case.
24. a. – Hydrochloric acid (HCl)
 b. – Enzyme pepsin in inactive form pepsinogen.
 c. – Mucus
 d. – HCl makes medium acidic for the activation of the enzyme pepsin.
 e. – Pepsin acts in an acidic medium that breaks down proteins into peptones.
 f. – The mucus protects the inner lining of the stomach from the corroding action of HCl.
25. **Real image:**
- When rays of light after reflection meets at a point real image is formed.
 - Real images can be obtained on the screen.
 - A real image is formed in front of the mirror.
 - A real image is always inverted.

Virtual image:

- When rays of light do not meet but appear to meet at a point after reflection, the virtual image is formed.
- Virtual images cannot be obtained on the screen.
- A virtual image is formed behind the mirror.
- A virtual image is always erect.

OR

Power of convex lens, $P_1 = \frac{1}{f_1} = \frac{1}{0.25} = 4 \text{ D}$

Power of concave lens, $P_2 = \frac{1}{f_2} = \frac{1}{-0.1} = -10 \text{ D}$

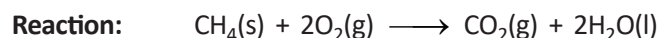
Power of combination, $P = P_1 + P_2 = 4 \text{ D} - 10 \text{ D} = -6 \text{ D}$

26. i. Usage of paper or jute bags instead of plastic ones.
 ii. Segregation of biodegradable and non-biodegradable wastes in separate dustbins.

Due to the use of environment-friendly practices or habits, we can save our environment. Environment-friendly practices can reduce pollution and also save natural resources so that sustainable use for the future generation can be restored.

SECTION – C

27. a. A combustion reaction is an oxidation reaction because it is always carried in the presence of air or oxygen. For example,



- b. Bring a burning match stick close to the mouth of the tube from which hydrogen gas escapes. The gas will immediately catch fire and this will be accompanied by a pop sound.
- c. Silver metal is a very less reactive metal in the sense that it occupies a place below hydrogen in the reactivity series. Therefore, it does not evolve H_2 gas on reacting with either dilute H_2SO_4 or dilute HCl.

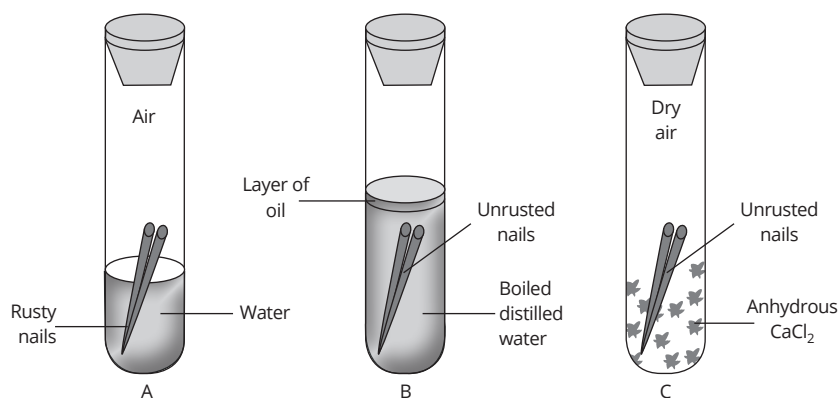
28.

	Galvanisation	Alloying
i.	It is the process of applying a protective zinc coating to steel or iron, to prevent rusting.	It is the process of combining two or more metals or a metal and a non-metal.
ii.	It is done through electrolysis.	It is done by heating the primary metal and adding other elements in definite proportions and then cooling it down to room temperature.
iii.	The properties of the inner metal are not changed.	The properties like strength, conductivity, etc. are changed.

OR

Activity:

- Take three test tubes and put clean nails in each of these tubes. Label them as A, B and C.
- Pour some water into test tube A and cork it to make it airtight.
- In tube B, pour some boiled distilled water along with some turpentine oil and cork it.
- In test tube C, add some anhydrous $CaCl_2$ and cork it.
- Look at these test tubes properly and keep them undisturbed for a few days.



Observation: The iron nails get rusted only in test tube A since the nails in this test tube are exposed to both air and water.

Conclusion: Both air and water are required for the rusting of iron.

29. a. When a squirrel senses a dangerous situation, the adrenaline hormone is released in its blood which increases its heartbeat and blood flow to the tissues which provides energy to its cells and tissues at a faster rate and allows it to run away from an emergency situation.
- b. Receptors are cells, tissues, or organs that receive the information in form of stimulus. On the other hand, effectors are muscles, glands, tissues, or cells that respond according to the information received through motor neurons from the central nervous system.
- c. The non-directional responses to stimuli are called nastic movements while the movement of plant parts towards or away from a stimulus is called curvature movements.

30. Given ${}^w\mu_a = \frac{4}{3}$ and ${}^g\mu_a = \frac{3}{2}$
 Speed of light in glass = 2×10^8 m/s

To find – Speed of light in air = ?

Speed of light in water = ?

a. ${}^g\mu_a = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$

$$\frac{3}{2} = \frac{\text{speed of light in air}}{2 \times 10^8 \text{ m/s}}$$

$$\text{Speed of light in air} = \frac{3 \times 2 \times 10^8 \text{ m/s}}{2}$$

$$= 3 \times 10^8 \text{ m/s}$$

b. ${}^w\mu_a = \frac{\text{speed of light in air}}{\text{speed of light in water}}$

$$\frac{4}{3} = \frac{3 \times 10^8 \text{ m/s}}{\text{speed of light in water}}$$

$$\text{Speed of light in water} = \frac{3 \times 3 \times 10^8 \text{ m/s}}{4}$$

$$= 2.25 \times 10^8 \text{ m/s}$$

31. The band of coloured components of the light beam is called its spectrum. The sequence of the colours is given by the acronym V I B G Y O R which stands for Violet, Indigo, Blue, Green, Yellow, Orange, and Red.

The speed of light of all the colours in a medium like 'the glass' is different. Variable speeds for different colours lead to diverse refractive indices for distinct colours. It has been observed that the refractive index of glass for violet colour is more than that for red colour. All the colours present in white light refract through different angles and hence, emerge out from the prism in different directions and become distinct.

32. a. When the N-pole is pushed into the coil, a momentary deflection is observed in the galvanometer. This deflection indicates that a momentary current is generated inside the coil.
 The direction of current in the coil is anticlockwise. When seen from the end from where the magnet was inserted.
- b. When the magnet is held at rest, there is no deflection in the galvanometer. It signifies that no current is produced in the coil in this case.
- c. In pulling the magnet out of the coil, a deflection in opposite direction is observed. It implies that the current produced in the coil is in opposite direction.

OR

An electric fuse is a safety device consisting of a piece of thin wire of material having a low melting point and a high resistance. It melts and breaks the circuit if the current exceeds a safe value, hence, prevents the electrical appliances in circuit from getting damaged.

33. Sustainable management of natural resources is important because
- the resources of our planet are limited and because of the rapid growth in the human population, the need for these resources is rising day by day. Proper management of the resources can ensure that

they are used judiciously so that the resources fulfill the needs of the present generation and also last for generations to come.

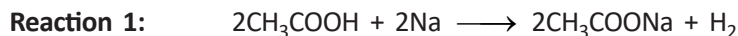
- it also takes into consideration the long-term perspective and prevents the exploitation of natural resources for short-term gains.

The process of 'Reuse' is better than that of 'Recycling' because some energy is used to recycle old objects but no energy is required during reuse.

SECTION – D

34. Here, compound C is ethanoic acid (CH_3COOH), compound R is sodium ethanoate (CH_3COONa), compound A is ethanol ($\text{C}_2\text{H}_5\text{OH}$) and compound S is ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$).

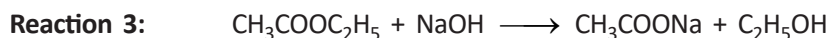
Ethanoic acid (CH_3COOH) reacts with sodium metal to form sodium ethanoate (CH_3COONa).



Ethanoic acid (CH_3COOH) on treatment with ethanol ($\text{C}_2\text{H}_5\text{OH}$) in the presence of an acid forms a sweet-smelling ethyl ethanoate ($\text{CH}_3\text{COOC}_2\text{H}_5$).



On adding NaOH to ethanoic acid (CH_3COOH), it also gives sodium ethanoate (CH_3COONa) and water.



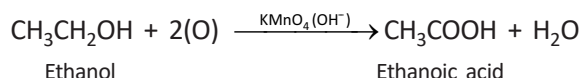
Therefore, compound C is ethanoic acid.

OR

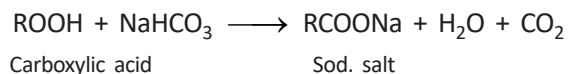
- a. Homologous series represent different families of organic compounds into which these are divided.

Two characteristics of homologous series are listed.

- All the members in a particular homologous series of families have the same characteristic functional group. For example, in organic acids, the functional group is the carboxyl group ($-\text{COOH}$).
 - Any two consecutive members in a particular family have the same common difference of CH_2 in their molecular formulae. For example, the first three members of the family of alkanes are CH_4 methane, C_2H_6 ethane, and propane (C_3H_8).
- b. On adding a 5% solution of alkaline potassium permanganate to ethanol, it will be oxidised to ethanoic acid. The pink colour of the solution will get discharged upon warming.

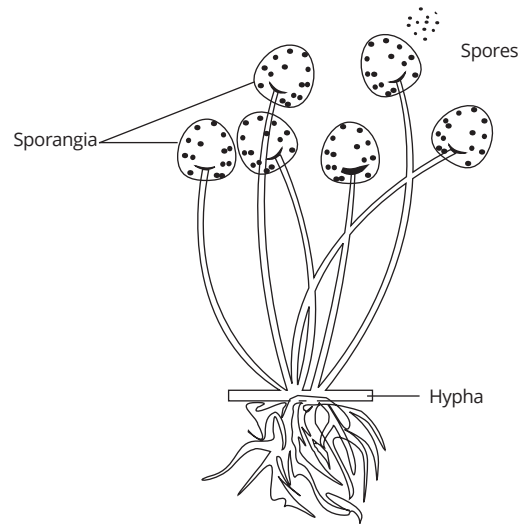


- c. A carboxylic acid gives a brisk effervescence when an aqueous solution of sodium hydrogen carbonate (NaHCO_3) is added to it. This is due to the evolution of CO_2 gas. However, alcohol will not give any reaction.



35. Fungus *Rhizopus* reproduces by spore formation. During the growth of *Rhizopus*, small rounded, bulb-like structures develop at the top of the erect hyphae. Such structures are called sporangia. Inside each sporangium, the nucleus divides several times. Each nucleus gets surrounded by a little amount of cytoplasm to become a spore.

A large number of spores are formed inside each sporangium. After some time sporangium bursts and spores are released into the air. When these spores land on food or soil, under favourable conditions, they germinate into new individuals.



OR

In the process of reproduction, if DNA copying is not perfectly accurate, variation occurs. These in turn may allow a few individuals of a population to survive in an altered niche and becomes the basis of evolution over time. Such variations are useful for the survival of species.

The combination of DNA copies of two individuals, (male and female) occurs during sexual reproduction. Reduction division (meiosis) during gamete formation halves the chromosome number in both male and female gametes. Since these two gametes fuse during fertilisation, the original number of chromosomes (as in the parent) is restored in the offspring. In this way, the amount of DNA remains constant in each new generation.

36. Given; resistivity of copper = $1.6 \times 10^{-8} \Omega \text{ m}$, diameter of wire, $d = 0.5 \text{ mm}$ and resistance of wire, $R = 100 \Omega$

$$\begin{aligned} \text{Radius of wire, } r &= \frac{d}{2} = \frac{0.5}{2} \text{ mm} \\ &= 0.25 \text{ mm} = 2.5 \times 10^{-4} \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Area of cross section of wire, } A &= \pi r^2 \\ \therefore A &= 3.14 \times (2.5 \times 10^{-4})^2 \\ &= 1.9625 \times 10^{-7} \text{ m}^2 \\ &= 1.9 \times 10^{-7} \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{As, } R &= \rho \frac{l}{A} \\ \therefore 100 \Omega &= \frac{1.6 \times 10^{-8} \Omega \text{ m} \times l}{1.9 \times 10^{-7} \text{ m}^2} \\ l &= 1200 \text{ m} \end{aligned}$$

If diameter is doubled ($d' = 2d$), then the area of cross section of wire will become

$$A' = \pi r'^2 = \pi \left(\frac{d'}{2} \right)^2 = \pi \left(\frac{2d}{2} \right)^2 = 4A$$

Now $R \propto \frac{1}{A}$, so the resistance will decrease by four times or new resistance will be

$$R' = \frac{R}{4} = \frac{100}{4} = 25 \Omega$$

SECTION – E

37. a. Metal B is the most reactive as it gives a displacement reaction with iron(II) sulphate.
 b. When metal B is added to copper(II) sulphate solution, a displacement reaction will take place because of which the blue colour of copper(II) sulphate solution will fade and a red-brown deposit of copper will be formed on metal B.
 c. Metal B is the most reactive because it displaces iron from its salt solution. Metal A is less reactive because it displaces copper from its salt solution. Metal C is still less reactive because it can displace only silver from its salt solution and metal D is the least reactive because it cannot displace any metal from its salt solution. Hence, the decreasing order of reactivity of the metals is $B > A > C > D$.

OR

- c. Metal D is the least reactive as it does not react with any of the solutions.
38. a. Individuals develop acquired trait due to environmental influence. The change is not encoded in their DNA and therefore, cannot pass from one generation to the next. Hence, the experience of an individual during its lifetime cannot be passed to its progeny and they cannot direct evolution.
 b. Differences between acquired and inherited traits.

	Inherited traits	Acquired traits
1.	These are genetic variation (involves reproductive tissues).	These are somatic variation (involves non-reproductive tissues)
2.	These traits are passed on from one generation to the next generation.	These traits develop during the life of an individual and die with the death of the individual. So cannot be inherited.

- c. Genes, present on the chromosomes, are the physical basis of heredity.

OR

- c. Variation in an individual may be advantageous or harmful. Advantageous variations enable an organism to cope with the changes in the environment and are hence selected by the nature. Such variations lead to evolution and formation of new species. Harmful variations do not allow the organism to cope with the changes in the environment. Hence, organisms are eliminated from the environment.
39. a. The red-coloured light will not split into any substituent colours on passing through the prism.
 b. A spectrum is said to be impure in which there is an overlapping of different colours. The same case is observed when a beam of white light is passed through a glass prism. Hence, it forms an impure spectrum.
 c. In VIBGYOR the slowest to fastest speed of the colours are from violet to red, which means that violet has the slowest speed while red has the maximum speed. Whenever light is going from the rarer to denser medium then the light bends towards the normal and whenever the light moves from rarer to denser the light moves away from normal. The speed of red light is the fastest and therefore, there is the least bending of red light whereas the speed of the violet light is slowest and hence, it bends the most of all the colours.

OR

- c. The cause of dispersion is that the speed of various component colours of light is different in the same medium. When a sunlight enters into the prism, it separates due to different refrangibility of the component colours. The angle through which light of a particular wavelength can deviate, while passing through a prism is called refrangibility. Thus, when a white light is incident on the face of prism, it gets dispersed.