SOLUTIONS

SELF ASSESSMENT TEST - 1

Maximum Time: 1 hour **MM: 25**

1. (a) They are highly inert

(b) They are present in very low concentrations in our environment.

2. Atomic mass of Na $= \frac{7+39}{2} = \frac{46}{2} = 23$

3. Henry Moseley: Properties of elements are a periodic function of their atomic number.

4. (d) **A is false but R is true**

According to Mendeleev's periodic law, the properties of elements is the periodic function of their atomic masses.

5. (a) Dobereiner's system of classification failed to arrange all the elements in the form of triads having similar chemical properties. Dobereiner could identify only three triads from the elements known at that time.

(b) Mendeleev left some gaps in his periodic table for the elements yet to be discovered. He even predicted the properties of these elements by studying the properties of the neighbouring elements

6. (a) Noble Gas : G, Halogen : F

(b) B : 2, 8, 1 F : 2, 8, 7

B → 1 ← F → 1

Formula : BF

7. (a) Atomic radius decreases.

(b) Metallic character decreases.

8. (i) Two elements of group 1 are Na, K / Sodium, potassium. **2×½**

Electronic configurations Na = 2, 8, 1; K = 2, 8, 8, 1 **2×½**

(ii) Similarity : Both have one valence electron / One electron in outermost shell. ½

(iii) Oxide : Na_2O, K_2O. ½

9. • Aim of Classification : For systematic and simplified study of elements and their compounds ½

• Property Used in the development of modern Periodic Table:

Basic property : Atomic Number. ½

• Modern periodic Law : The properties of elements are a periodic function of their atomic number. ½

• Metals are found on the left side and centre of the Modern Periodic Table. ½

• Metalloids are found in a zig-zag manner between the metals and the non-metals. ½

• Non-metals are found on the right side of the Modern Periodic Table.

10. (a) (iv) Element : E

(b) (iii) 2

(c) (i) Y and Z

(d) (ii) Seven

(f) Atomic radii decrease across a period , so A will have largest atomic radius.

11. (a) It belongs to the 4th period because it has four energy shells and period number of an element is equal to the number of energy shells.

It belongs to 2nd group because it has 2 valence electrons and the group number of an element having upto two valence electrons is equal to the number of valence electrons.

(b) Its valency is '2'. To acquire inert gas configuration 'X' either loses 2 electrons or gains 6 electrons. Since the shorter route is to lose 2 electrons for obtaining inert gas configuration, hence its valency is 2.

(c) It is a metal as it has two electrons in its outermost shell and it loses these two electrons to acquire inert gas configuration and form +2 ion.

(d) The oxide of calcium is calcium oxide (CaO)

Ca → 2 ← O → 2

■■

SELF ASSESSMENT TEST - 2

Maximum Time: 1 hour **MM: 25**

1. (i) **Correct option : (b)**

Explanation : If salivary amylase is lacking in the saliva, the process of starch digestion will get disturb as salivary amylase helps in digestion of starch. **1**

(ii) **Correct option : (a)**

Explanation : Valves ensure that blood does not flow backwards when the atria or ventricles contract. Semilunar valves, the valves present between ventricles and their attached vessels, serve to prevent the back flow of blood to ventricles from their respective attached vessels. Likewise, atrioventricular (AV) valve between atrium and ventricle directs the flow of blood and prevents any back flow into atria. **1**

(iii) **Correct option : (c)**

Explanation : Bread mould prefers damp and warm substratum with ample supply of nutrients on which its air-borne spores land and germinate to produce mycelium. 1

(iv) **Correct option : (a)**

Explanation : As roundness and yellow colour are shown by capital letters in the genotype, so they are dominant traits. In F1 generation, only dominant traits are expressed. **1**

2. (i) **Correct option : (d)**

Explanation : Valves are absent in arteries, whereas it is present in veins, which prevent back flow of blood. **1**

(ii) **Correct option : (a)**

Explanation : Speciation is an evolutionary process by which new species arise. One of the factors that lead to speciation is mutation. **1**

3. Cranial nerves arising from the brain and the spinal nerves arising from the spinal cord. 1

4. The hormone is thyroxin.

The site where it is synthesized is thyroid gland. **1+1**

5. (a) (i) Positively phototrophic : Shoot

(ii) Negatively geotropic : Shoot

(b) Root

(c) Shoot tip **1+1+1**

6. Bile juice makes the acidic food coming from the stomach alkaline for the action of pancreatic enzymes. Bile salts break the large globules of fat in the intestine to smaller globules increasing the efficiency of enzyme action. This is similar to the emulsifying action of soaps on dirt. **3**

7. (a) (i) Testis : To produce male gametes / sperm or male hormone / testosterone.

(ii) Scrotum : To provide optimal temperature to testis for the formation of sperms.

(iii) Vas deferens : To deliver the sperms to the urinary bladder.

(iv) Prostrate glands : To secrete the fluid which provides nutrition and medium for transport of sperms. **4 × ½**

(b) (i) Regulates formation of sperms

(ii) Brings about the changes in boys during adolescence. **½ + ½**

8. (i) Homologous organs: Forelimb of human and bird are homologous organs. They have same structural design and developmental origin, but they have different functions and appearance. Homologous organs help us to understand that the organisms have evolved from a common ancestor.

The more common characteristics the two species have, the more closely they are related.

(ii) Analogous organs: Analogous organs are those organs which have different basic structural design and development origin but have similar appearance and perform similar functions.

Example: The wings of birds and bats look similar but have different design in their structure. They have a common function of flying, but their origins are not common. So, birds and bats are not closely related.

(iii) Fossils and their study is useful in knowing about the species which are no longer alive.

They provide evidence and missing links between two classes. They are helpful in forming a sequence of organisms in the pathway of evolution.

Thus, fossils have an importance in deciding evolutionary relationship. *Archaeopteryx* is a fossil bird. It had feathers, fused bones and beak which are exclusively bird structures. It also had some features which are found in reptiles *e.g.*, teeth in jaw, claws on free fingers and a long tail. This fossil provides a clue that birds have evolved from reptiles. **1+1+1**

9. Unisexual Flower: Papaya/Water-melon/ any other **(any one)** ½

Bisexual Flower: *Hibiscus*/Rose/ any other **(any one)** ½

Self pollination: The pollen grains are transferred from the anther to the stigma of the same flower or to the flower of the same plant. **1**

Cross pollination: The pollen grains are transferred from the anther to the stigma of a flower of a different plant. **1**

- **After pollen lands on a suitable stigma, a pollen tube grows out of pollen grain and travels through the style to reach the ovary.** ½
- **The male germ cell fuses with the female germ cell to form a zygote.** ½
- **Zygote divides several times to form an embryo within the ovule.** ½
- **The ovule develops tough coat and gradually gets converted into a seed.** ½

■■

SELF ASSESSMENT TEST - 3

Maximum Time: 1 hour **MM: 25**

1. The planets are closer to the Earth as compared to the stars. Hence, the effect of atmospheric refraction is smaller. This is the reason due to which the planets do not twinkle.

2. The scattering of light by colloidal solution is called tyndall effect.

3. The angle of deviation increases when the wavelength of light is increased.

4. Correct option : (a)

The sky appears dark during travel by an airplane because there is absence of atmosphere at higher altitudes. The particles of light are not present for the scattering of at such altitude. Thus, the sky appears black.

5. Correct option : (c)

During the noon, the Sun is directly over the head due to which the light gets to travel comparatively lesser distance. The scattering of light happens to a lesser extent in this case since it has lesser air to travel through.

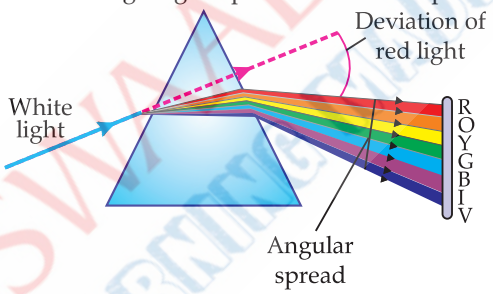
6. (i) The phenomenon of splitting of white light into its constituent colours when it is passed through a prism is known as dispersion of light.

(ii) The bending for red colour is least where as it is maximum for violet.

Violet, Indigo, Blue, Green, Yellow, Orange , Red

7. The reason for scattering of light is the interaction of light energy with the dust particles (comparable in size with the wavelength of light) in its path. Due to the scattering of light, the path of light beam becomes visible through a colloidal solution.

8. The angle between the extended incident ray and the emergent ray is called the angle of deviation. This is because the different colours travel through a glass prism at different speeds.



9. (a) Water droplets present in the atmosphere.

(b) (i) Least deviation – Red.

(ii) Maximum deviation – Violet.

(c) The colour of the scattered white light depends upon the size of the particles of the medium through which it is passing

10. (a) Place a prism on a white sheet of paper with the triangular face on the sheet and trace its boundary ABC.

(i) Fix two pins T and S on one side.

(ii) Place the prism on the boundary ABC.

(iii) Looking through the other side fix two more pins Q and R in such a way that all the four pins appear to be in the same line.

(iv) Remove the pins and mark their positions.

(v) Join TS and RQ and extend them to meet the faces of the prism at P and O respectively.

(vi) Join PO.

(vii) TP represents the incident ray.

(viii) PO represents the refracted ray.

(ix) And OR represents the emergent ray which is bent towards the base.

(x) Let PN and OM be the normal at the points P and O respectively.

(xi) And let i be the angle of incidence and r the angle of refraction.

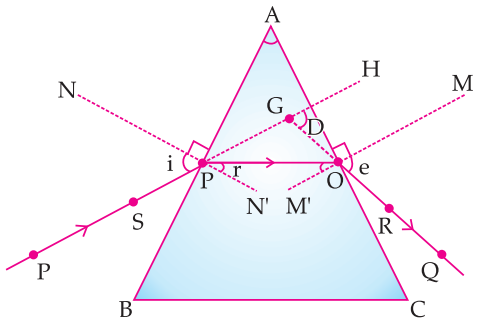
(xii) If the incident ray TP is extended forward and the emergent ray OR backwards, they meet at G, forming the angle HGO.

(xiii) Measure the angle HGO.

(xiv) This angle is called the angle of deviation.

(xv) Angle of deviation is the angle through which an incident ray deviates.

(xvi) Repeat this for different values of angle of incidence.



TP – Incident ray ∠ i – Angle of incidence

PO – Refracted ray ∠ r – Angle of refraction

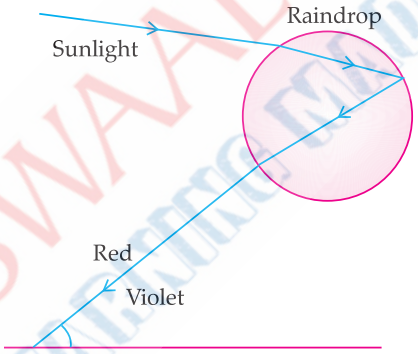
OR – Emergent ray ∠ e – Angle of emergence

DA – Angle of the prism ∠ D – Angle of deviation

3

(b) Rainbow forms when sunlight hits the water droplets suspended in the atmosphere and undergoes total internal reflection. When the sunlight comes out of the drop it disperses, where the drop acts like a small prism.

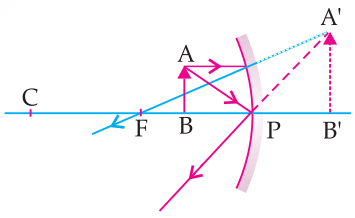
The dispersion or breaking up of light into several colours forms the Rainbow.



11. (a) (i) Range of the object distance is 0 to 20 cm from the pole.

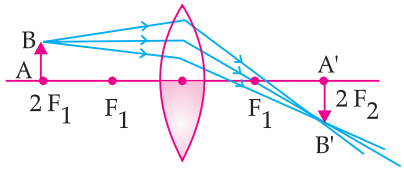
(ii) Image will be bigger than the object.

(iii) Ray diagram.



(b) (i) Yes, complete image will be formed.

(ii)



(iii) Intensity will be reduced as the light falling on the lower (covered portion will not reach the position if image.

■■

SELF ASSESSMENT TEST - 4

Maximum Time: 1 hour **MM: 25**

1. Inside the solenoid.

2. The direction of magnetic field at a given point can be determined by placing a small compass needle.

3. Direction of magnetic field will be upwards.

4. Option 2

Both the statements are right but 2nd is not the reason of first.

5. Nipermag is an alloy of iron, nickel, aluminium and titanium. Permanent magnet of this alloy is stronger than those made of ordinary steel. Hence it used in microphones and loudspeakers.

6. (a) Held stationary inside the coil: No deflection when a bar magnet is held stationary inside a coil.

(b) Pushed into a coil: An induced current is produced due to electromagnetic induction. Galvanometer will show deflection.

7. Fuse is used for protecting appliances due to short circuit or overloading. The fuse is rated for a certain maximum current and blows off when a current more than rated value flows through it.

If a fuse is replaced by one with large ratings, the appliances may get damaged while the protecting fuse does not burn off.

8. Electrical appliances – fan, washing machine, mixer. **(Any two)**

Fleming's Left Hand Rule – It states that ''Stretch the forefinger, so that the central finger and the thumb of your left hand are mutually perpendicular to each other. If the forefinger shows the direction of the magnetic field and the central finger shows current then the thumb will point towards the direction of motion of the conductor. **2**

9. An electromagnet is a solenoid coil that attains magnetism due to flow of current. It works on the principle of magnetic effect of current. **1**

(i) By suspending magnetised bar and identifying its north and south poles.

(ii) By finding the polarity of electromagnet using the property-like poles repel each other. **2**

Passage Based Questions:

Mahesh bought an electric iron and connected its wires into the two-pin plug. Obviously, the green wire was not connected anywhere. Few days later, his wife got a severe electric shock while ironing the clothes. The electrician told Mahesh that this situation could be averted had he connected the green wire also, using the three-pin plug. Mahesh learnt a lesson for a life-time.

Read the above passage and answer the following questions : **(Any four)**

1. (a) Red,black,green

2. (a) earthing

3. (b)live

4. (c) Joule's heating

5. (a) electric meter

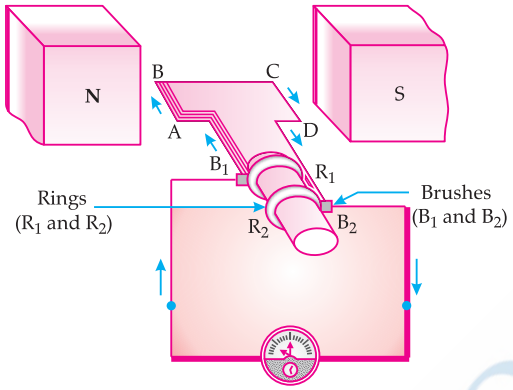
Long Answer Type Questions: **5**

10. Electric generator.

Principle : An electric generator works on the principle of Faraday's law of electromagnetic induction. Faraday's law of electromagnetic induction state that "whenever a current carrying conductor are placed in the magnetic field, then a flux is induce in the circuit due to which a current start to flow in the rotor.

Working : It works on the principle of electromagnetic induction discovered by Faraday. Generators are basically coils of electric conductors normally copper wire, that are tightly wound onto a metal core and are mounted to turn around inside an exhibit of large magnets. An electric conductor moves through a magnetic field, the

magnetism will interface with the electrons in the conductor to induce flow of electrical current inside it. The conductor coil and its core are called the armature, connecting the armature to the shaft of a mechanical power source, for example in a motor, the copper conductor can turn at exceptionally increased speed over the magnetic field.



■■

SELF ASSESSMENT TEST - 5

Maximum Time: 1 hour **MM: 35**

1. (i) **Correct option : (a)**
Explanation : The Sun has an enormous amount of energy at the present rate for nearly 5 billion years and will continue radiating at that rate for about 5 billion years more. So, it can be taken as an inexhaustible source of energy. **1**
(ii) Correct option : (d)
Explanation : According to 10% law, only 10% of energy is transferred to the next trophic level and remaining 90% energy is used in life processes by present trophic level. **1**
(iii) Correct option : (a)
Explanation : Biogas contains upto 75% methane. It burns without smoke and leaves no residue like ash in wood, charcoal and coal burning. **1**

2. (a) (i) A considerable increase in plant life in the lake was noticed after the farming activity intensified.
The most likely reason for this could be chemical fertilizers leached into the lake from the field.
(b) (i) Aquatic plants beings at the first trophic level will show minimum amount of pesticide concentration in them after considerable time.
(c) Yes. Biological magnification increases at each trophic level.
(d) (iv) Biofertilisers do not require large set-up for their production.
(e) Minimize the use of chemicals/pesticides in agriculture. **(Any four) 1+1+1+1**

3. (i) **Correct option : (a)**
Explanation : Biogas is considered to be a boon to the farmers as the slurry left in the biogas plant is a good manure for fields. **1**
(ii) **Correct option : (a)**
Explanation : Decomposers keep the environment clean by decomposing or consuming the dead remains of other organisms. **1**

4. A black surface absorbs more heat as compared to white or a reflecting surface.

5. Reuse : We can reuse the empty bottles of jam, pickles, etc. for the storage purposes.
Recycle : We can recycle old newspapers, aluminium cans, etc. ½+½

6. Ozone layer shields the earth surface from ultraviolet (UV) radiation of the Sun. These UV- rays may reach the earth due to depletion of ozone layer and cause health hazards/skin cancer in human beings. Therefore, it is a cause of concern. **1+1**

7. The involvement of local people is useful for successful management of forests in the following ways :
(i) People should be aware of the fact that diminishing forest cover would disturb the ecological balance.
(ii) Phenomena like forest fires must be reported immediately to the forest officers. The sooner the action taken more will be the area which can be protected. Forest fires purposely caused by local people must not be practiced. **1 + 1**

8. Consequences :
(i) Cause air pollution
(ii) The acidic oxides lead to acid rain
(iii) High concentration of green house gas (CO_2) and its effect
(iv) Global Warming **(Any 3 points)** ½ × 3
Steps to minimize the pollution:
(i) **Use of alternate source of energy**
(ii) **Use of various devices to reduce emission of harmful gases.**
(iii) **By increasing efficiency of combustion process (or any other)** ½ × 3 **[CBSE Marking Scheme, 2019]**

9. (i) Flow of energy is unidirectional.
(ii) Terrestrial plants take about 1% of the Sun's energy and change it to chemical energy.
(iii) A great amount of energy is lost as heat/ used for digestion/doing work/growth and reproduction.
(iv) Only 10% of organic matter present at each trophic level (and available to the next trophic level).
(v) Food chains are mainly of 3-4 trophic levels (because of 10 percent law).
(vi) The number of producers are maximum (the number reduces in subsequent trophic levels).

(vii) Food webs are more common (as compared to isolated food chains).
(viii) Biological magnification can be observed. **(Any three) 3**

10.

S. No.	Biodegradable Substance	Non–biodegradable Substance
(i)	The substance which are broken down into simpler, harmless substance in nature in due course of time by the biological processes such as action of microorganisms.	The substances which cannot be broken down into simpler, harmless substances in nature. These substances may be in solid, liquid or gaseous form and may be inert and accumulate in the environment.
(ii)	*e.g.*, Domestic waste products, sewage.	*e.g.*, DDT and polythene bags.

Two methods of disposal of non–biodegradable waste are:
(i) Recycling: The wastes are treated and same value materials are extracted for reuse.
(ii) Incineration: Medical and toxic waste are burnt at high temperature in incineration. Incinerators transform the waste into ashes. **2+1**

11. (a) **Ecosystem :** It is the functional unit of the environment comprising living and non-living components.
(b) The first trophic level in a food chain is always producers (plants) because they have the ability to trap solar energy with the help of chlorophyll. As a result, they produce food by photosynthesis.
(c) Frogs are secondary consumers. **1 +1+1**

12. (a) **(i) Reduce :** Less use of natural resources/ avoid wastage of food, water, electricity etc. **1**
(ii) Recycle : Collection of materials like plastic, glass, metals, paper, etc. and recycle these materials to make required items instead of synthesizing fresh ones. This would save natural resources. **1**
(iii) Reuse : Still better than recycling as no energy is required here and the already used things/ items are used again and again. **1**
(b) (i) Essential for living organisms.
(ii) It has limited availability.
(iii) Conservation of water allows its equitable distribution.
(iv) Essential for sustainable development. **(Any other relevant point) ½×4**

■■