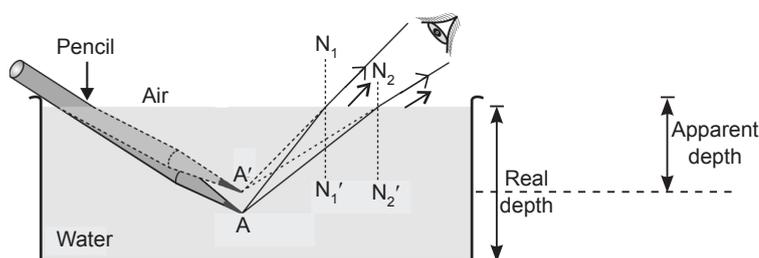


Answers to RSPL/2 (DS2)

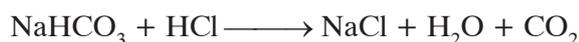
- The biogas consists of :
 - Methane (75%)
 - Carbon dioxide (20-25%)
 - Nitrogen ($\approx 10\%$)
 - Hydrogen (0-1%)
 - Hydrogen sulphide (0-3%)
- Building of large dams causes environmental problems, because it involves deforestation and loss of biological diversity.

3.

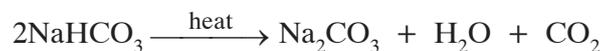


This difference in depth of a fluid occurs due to refraction of light

- Circulation of oxygenated blood:
 - The oxygenated blood is carried from the lungs by pulmonary veins to the left atrium, as it is relaxing.
 - When the left atrium contracts, the blood is pushed into the left ventricle which is relaxing.
 - When the left ventricle contracts, the blood is pumped into the aorta, whose branches supply blood to all different parts of the body.
- (a) It is weakly alkaline in nature and neutralizes acid (HCl) formed in the stomach.

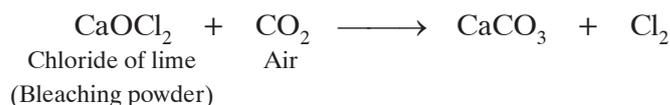


- (b) It evolves CO_2 in the form of bubbles when cake is made by baking. As a result, the cake becomes porous as well as fluffy.



Or

Chloride of lime is calcium oxychloride $[(\text{Ca}(\text{OCl})\text{Cl})]$ also known as bleaching powder. Calcium chloride is CaCl_2 . Bleaching powder loses its chlorine on exposure to air because CO_2 present in air reacts with it to evolve chlorine as follows:



6. (a) Central nervous system is composed of brain and spinal cord.
(b) Peripheral nervous system is composed of cranial nerves and peripheral nervous system.

Protection of CNS:

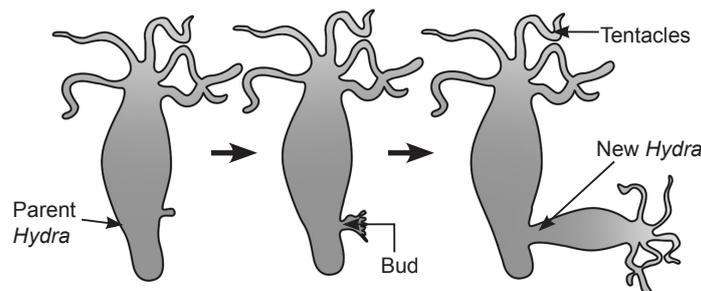
- The brain is protected by a bony box and inside the bony box, it is contained in a fluid-filled balloon-like structure, that acts as a shock absorber.
- The spinal cord is protected by the vertebral column.

7. (a) (i) Testes
- Testes produce the male germ cells for production.
 - They also secrete male sex hormones.
- (ii) Vas deferens
- It transports the sperms formed in the testis to urethra.
- (b) Variations appear during sexual reproduction because
- (i) of the errors that occur during DNA copying.
 - (ii) of combining of DNA copies from two different individuals.

Or

Budding in *Hydra*

- *Hydra* uses certain regenerative cells for reproduction by budding.
- A bud develops as an outgrowth due to repeated cell divisions at a specific site on the body.
- These buds develop into tiny individuals on the parent body.
- When they mature, they become detached from the parent body and start growing as new independent individuals.



Budding in *Hydra*

8. (a) The sun is near horizon at the time of sunrise and sunset. So sun rays have to travel a longer distance in earth's atmosphere. The particles of atmospheric air have size smaller than wavelengths of visible light. It scatters the blue colour and other smaller wavelengths of visible light. Red colour, having the longest wavelength, is least scattered and reaches our eyes. Thus sun appears reddish.
- (b) No, this phenomenon cannot be observed on moon. There is no atmosphere on moon to scatter sunlight on moon.

9. (a) (i) Pineal gland (ii) Pituitary gland
(iii) Thyroid gland (iv) Thymus gland

- (b) – The disorder is goitre.
– The main symptom is a swelling in the neck.

10. Evolution and classification.

- Similarities among organisms will allow us to group them together.
- Certain basic characteristics are shared by most of the species.
- The more characteristics the two species will have in common, the more closely they are related.
- Such more closely related species will have a more recent common ancestor.
- We can thus build up small groups of species with recent common ancestors, then super-groups of these groups, with more distant common ancestors, etc.

11. (a) The direction of AC reverses periodically while that of DC remains same and current flows in same direction.

(b) AC source: AC generator

DC source: Battery

(c) AC is preferred over DC because it can be transmitted over long distances without much loss of energy.

OR

(a) The field lines in and around a current carrying solenoid are similar to that of a bar magnet, pointing from north pole to south pole outside the solenoid and from south pole to north pole inside the solenoid.

(b) Alloy of lead tin has low melting point and melts to break the circuit when current exceeds a safe limit. But copper wire would not melt in such a case.

(c) Soft iron core increases the strength of electromagnet without getting permanently magnetised.

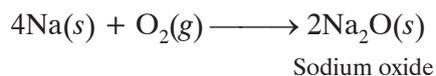
12. (a) Current, $I = \frac{P}{V} = \frac{1500 \text{ W}}{220 \text{ V}} = 6.8 \text{ A}$

(b) $t = 30 \text{ days} \times 2 \text{ h} = 60 \text{ h}$

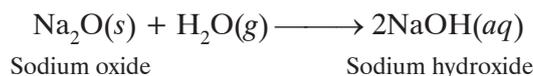
Energy = $PT = 1500 \text{ W} \times 60 \text{ h} = 1.5 \text{ kW} \times 60 \text{ h} = 90 \text{ kWh}$

(c) Cost of energy consumed = ₹ 5 × 90 = ₹ 450

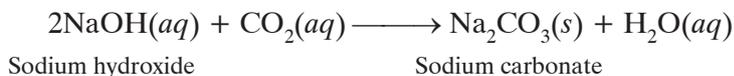
13. Air contains oxygen, carbon dioxide and moisture (water vapours). Sodium initially reacts with oxygen to form sodium oxide (Na₂O).



Sodium oxide dissolves in moisture present in air to form sodium hydroxide.



Sodium hydroxide then combines with carbon dioxide present in air to form sodium carbonate.



The surface of the metal gets tarnished or dull due to deposition of layer containing Na_2O , NaOH and Na_2CO_3 . Therefore, sodium metal cannot be kept in air. The metal cannot be kept in water also because it reacts violently with water and catches fire.



Sodium metal is therefore, kept in kerosene so that the metal may not come in contact with air and water.

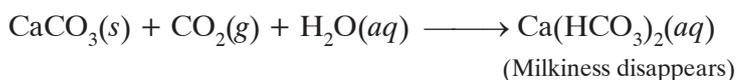
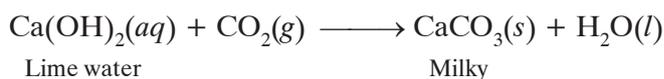
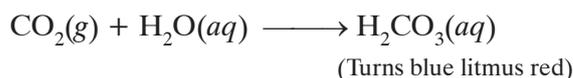
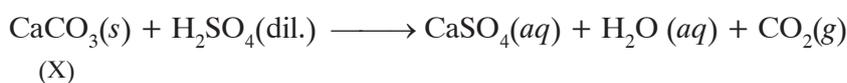
14. (a) $3\text{Fe}(s) + 4\text{H}_2\text{O}(g) \longrightarrow \text{Fe}_3\text{O}_4(s) + 4\text{H}_2(g)$.
 (b) It is a double displacement reaction also called precipitation reaction. A white precipitate of BaSO_4 is formed in the reaction.
 (c) (i) The black substance is formed due to the oxidation of copper.
 (ii) The black substance is cupric oxide or copper (II) oxide with formula CuO .
15. (a) Carbon dioxide gas will evolve and sodium carbonate will be left.



- (b) Sodium hydroxide (NaOH) is a strong base. It immediately dissociates in solution to give OH^- ions and cations. Upon dissolving more of base in the solution, the concentration of OH^- ions further increases.
 (c) The pH of a solution is inversely proportional to the concentration of H^+ ions in solution. Lesser the pH of the solution, more will be the H^+ ion concentration. The solution A with pH 6 has more H^+ ion concentration than the solution with pH equal to 8. The solution A is acidic because its pH is less than 7 and the solution B is basic because its pH is more than 7.

Or

The water in soluble substance 'X' is most probably some metal carbonate (CaCO_3). The chemical equation that are involved are given.

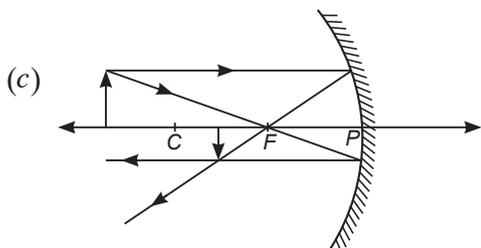


or

$$f = \frac{(-60)(-30)}{-60 - 30}$$

$$= \frac{-60 \times 30}{90} = -20 \text{ cm}$$

(b) The mirror is concave.



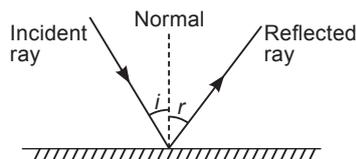
OR

(a) Reflection is defined as the phenomenon of bouncing back of light into the same medium on striking an opaque surface. Laws of reflection of light are stated as:

- Incident ray, normal and reflected ray, all lie in the same plane.
- Angle of incidence is equal to angle of reflection,

i.e.

$$\angle i = \angle r$$



(b) Characteristics of image formed by plane mirror are:

- Image is virtual and erect.
- Image is of same size as object.
- Image is laterally inverted.
- Image distance is equal to object distance.

18. (a) (i) d (ii) 4 (iii) e or g (iv) 2 (v) h (vi) e

(b) The electronic configuration (2, 8, 2) of the element X suggests that it belongs group 2 of the periodic table and is Mg. It is divalent. The chemical formulae of the compounds are:



The compounds of the elements are generally ionic because by losing the two valence electrons, the element X(Mg) achieves the electronic configuration of the noble gas element neon (2, 8).

19. (a) Metals are good conductors of electricity because they have one, two or three electrons in their outermost shell which conduct electricity as free electrons.

(b) The free electrons present in a metallic conductor are in a state of random motion. Even on applying potential difference across the ends of the conductor, when electrons start

drifting in one direction, they suffer frequent collisions and forces due to positive ions and other electrons. This obstructs their free motion in one direction and gives rise to resistance in the conductor.

(c) The resistance of a conductor depends on following factors:

- length of conductor
- temperature of conductor
- cross section of conductor
- material of conductor (any two)

(d) The volume of the wire remains constant even when it is stretched to double its length. If initial length = l_1 and area = A_1 ;

On stretching it becomes l_2 and A_2 respectively,

then $A_1 l_1 = A_2 l_2$

$$A_1 l_1 = A_2 (2l_1)$$

or $A_2 = \frac{A_1}{2}$

$$\text{Thus, final resistance } R_2 = \frac{\rho l_2}{A_2} = \frac{\rho (2l_1)}{\frac{A_1}{2}} = \frac{4\rho l_1}{A_1} = 4R_1$$

$$R_1 = 5 \Omega$$

$$\therefore R_2 = 4 \times 5 = 20 \Omega$$

Resistivity remains unchanged as it is independent of dimensions of the conductor.

20. (a) (i) C_2H_4 because unsaturated hydrocarbons undergo incomplete combustion.

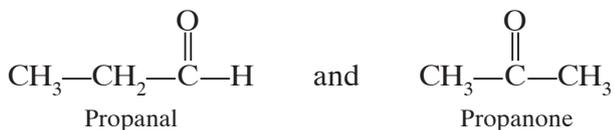


(iii) Alkaline $KMnO_4$ or Acidified $K_2Cr_2O_7$.

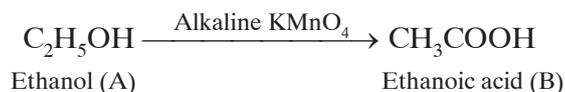
- (b) • Homologous series: Series of hydrocarbons having similar functional group and similar chemical properties and every next (successive) member formed by addition of CH_2 having 14 amu.
- The compounds CH_4O and C_2H_6O belong to homologous series of alcohols.

Or

(a) The aldehyde and ketone with formula C_3H_6O are propanal and propanone. Having the same molecular formula, these are isomers. As the functional groups are different, these are regarded as functional isomers. For example,



(b) The compound 'A' is ethanol and with alkaline $KMnO_4$, it is oxidised to ethanoic acid 'B'. The chemical equation for the reaction is:



21. (a) Differences are as follows:

Biodegradable substances	Non-Biodegradable substances
<ul style="list-style-type: none"> – These are the substances which can be broken down into simpler harmless substances by biological processes. – They are disposed/decomposed in a short time. <p>e.g. paper, vegetable peels, leather goods, etc.</p>	<ul style="list-style-type: none"> – These are the substances which cannot be broken down into simpler ones by biological processes. – They stay for very long periods in the environment. <p>e.g. aluminium cans, plastics, etc.</p>

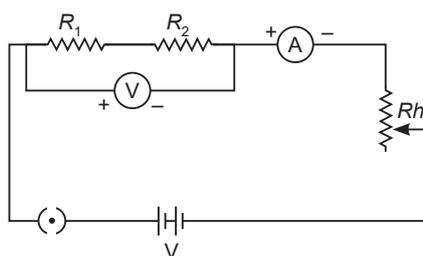
(b) Biomagnification is the phenomenon in which certain harmful chemicals enter the food chain and get accumulate at higher trophic levels as they travel along the food chain.

- It occurs with certain substances as they are not degradable in the body of organisms; they simply accumulate and increase in their concentration.

22. The student will select voltmeter V_2 :

- The measuring instrument should have a large range which is greater in V_2 than V_1 .
- The instrument should have smaller least count so that it detects even a slight change in the value of potential.

OR

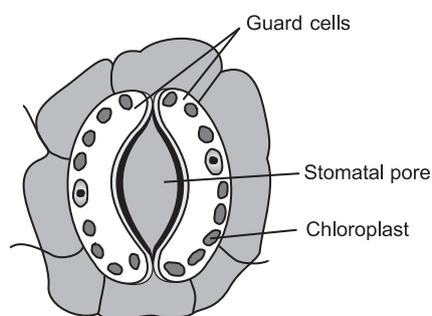


The voltmeter terminals have been reversed so that the voltmeter shows reading on the scale. The voltmeter has been connected in parallel with the resistors so that equal potential drop occurs through it as the resistors.

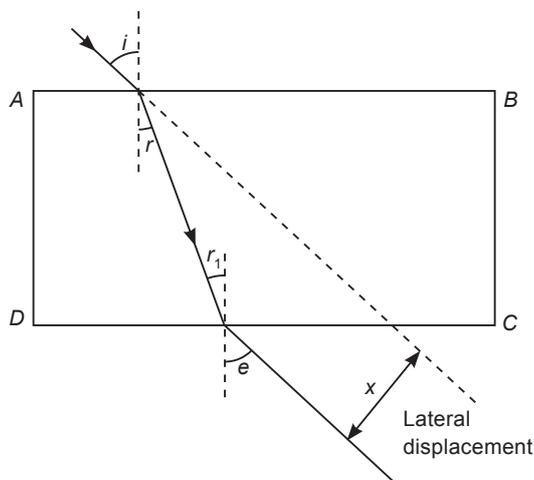
23. Differences are as follows:

Guard cells	Epidermal cells
<ul style="list-style-type: none"> – Guard cells are bean/kidney shaped. – They have chloroplasts. 	<ul style="list-style-type: none"> – These are polygonal or variously shaped. – They do not have chloroplasts.

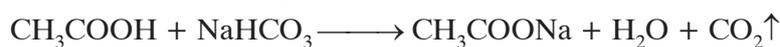
Or



24. (a) The lateral displacement of emergent ray will increase.
 (b) The lateral displacement of emergent ray will increase.



25. Acetic acid is colourless, has smell of vinegar and gives brisk effervescence due to evolution of CO_2 on reaction with NaHCO_3 .



26. (a) • $\text{Al} > \text{Zn} > \text{Fe} > \text{Cu}$ reactivity of metals
 • $\text{Al} < \text{Zn} < \text{Fe} < \text{Cu}$ decreasing order of reactivity

(b) Solution	Colour
ZnSO_4	Colourless
CuSO_4	Blue
$\text{Al}_2(\text{SO}_4)_3$	Colourless
FeSO_4	Pale green

27. (a) Plumule gives rise to the shoot-system on germination of the seed.
 (b) Cotyledons store food materials for the embryo to be used during germination.
 (c) Radicle gives rise to the root system on germination of the seed.