

Answers to RSPL/2 (DS1)

1. Waste water can be used in the following ways:
 - (a) For recharging the ground water.
 - (b) For irrigation.
 - (c) Certain pollutants in sewage water can become fertiliser for various crops. (any two)
2. (i) **Molecular mass:**

In terms of molecular mass, each successive member in a homologous series differ by molecular mass of 14 Dalton by the preceding member.

(ii) **Number of atoms:**

There is a difference of one carbon atom and two hydrogen atoms between two consecutive members of homologous series that is of one CH_2 molecule or three atoms.
3. (a) (i) Thermal power plants are large emitters of greenhouse gases.
(ii) The fuel causes environmental problems due to pollution.
(b) (i) same voltage.
(c) Electric energy: It is equal to the product of power and time.
Electric power: It equal to the rate of doing work by an energy source.
(d) Hydro energy and wind energy.
4. (a) The mouse with the tan colour fur would have the highest fitness because of its ability to survive and reproduce.
(b) It clearly has higher levels of both compared to the other mice. This is more than likely because of their ability to blend in with their surroundings and hide from their predators
(c) Law of Segregation
(d) 3 : 1
5. (c) Magnetic field is a quantity that has both direction and magnitude.

OR

- (c) Electric generator works on the basis of electromagnetic induction.
6. (c) Common salt besides being used in kitchen can also be used as the raw material for making baking soda.
 7. (a) Ground water will not be depleted due to afforestation.

OR

- (d) All of the above.
8. (a) A molecule of ammonia contains only single bonds. The nitrogen in ammonia contains five electrons. It uses three of its electrons to form a single covalent bond with each of the three hydrogens. The two electrons left are present as lone pair on nitrogen. The hybridization in NH_3 is thus sp^3 .

OR

- (d) 4

9. (a) All metals are termed as elements that contribute good electrical conductivity. They are also good conductors of heat. Most of them are electropositive in nature and the atoms of metals lose electrons during chemical reactions to form cations. The more reactive a metal, the greater is the tendency to form a positive ion during a chemical reaction.



10. (c) Structural isomers have same molecular formula but different parent chain of carbon atoms in the molecule.

11. (a) $Q = ne$ and $Q = It$

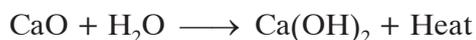
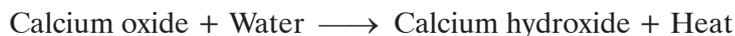
$$\begin{aligned} \therefore ne &= It \\ \text{or } n &= \frac{It}{e} = \frac{1 \times 16}{1.6 \times 10^{-19}} \\ &= 10^{20} \text{ electrons} \end{aligned}$$

12. (b) Assertion and Reason are correct but Reason is not the correct explanation of the Assertion.

13. (a) Both Assertion and Reason are correct and Reason is the correct explanation of the Assertion.

14. (b) Assertion and Reason are correct but Reason is not the correct explanation of the Assertion.

15. Calcium oxide in presence of water reacts and give calcium hydroxide also called slaked lime. A lot of heat is produced in the reaction, (exothermic reaction) which may even cause the water to boil.

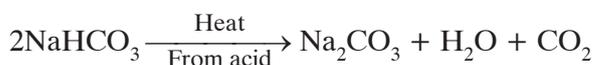


OR

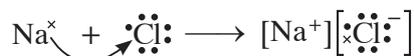
The name of that white powder is baking powder, which makes the breads and cakes soft and fluffy. Baking soda (NaHCO_3) releases CO_2 gas when heated and this makes the cake soft and fluffy.

The main ingredients of a cake or a bread are baking powder, baking soda, salt, sugar, yeast and the most important, 'flour'. Tartaric acid is used to avoid the bitter taste of cake by reacting with Na_2CO_3 formed.

Chemical reaction involved:



16. (i) $\text{Na} \longrightarrow \text{Na}^+ + e^-$



20. Mendel used pea plant for his experiment.

When he cross-bred the tall and the short varieties of pea, then in F_1 generation he got all tall plants.

He self pollinated F_1 plants and got F_2 generation in which he got three tall and one short plant. From this he concluded on breeding of tall and short plants, the ratio of tall : short was 3 : 1. This was the phenotypic ratio but the genotypic ratio was 1 : 2 : 1, i.e. one pure tall, two hybrid tall and one pure short.

21. Biological magnification is the process of increase in the concentration of a toxic chemical with increasing trophic level in a food chain. Harmful or poisonous substance sprayed to kill pests on plants enter the food chain. The plants absorb these harmful chemicals from soil along with water and minerals. They enter the food chain at producer level and then transfer to the next trophic level. The tertiary consumers get more higher levels of these chemicals. This is because these harmful substances are neither used or excreted by any of the consumers. Also the tertiary consumer cannot excrete out the harmful substances, as a result these substances start getting accumulated in the tertiary consumer.

22. For spherical mirror, magnification is given by

$$m = \frac{\text{Height of the image } (h_i)}{\text{Height of the object } (h_o)} = \frac{h_i}{h_o} = -\frac{v}{u}$$

$$m = \frac{-h/5}{h} = -\frac{1}{5} = \frac{-v}{u}$$

$$\therefore u = 5v = 5 \times (-18) = -90 \text{ cm}$$

Using, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$, we get

$$\frac{1}{f} = \frac{1}{-18} + \frac{1}{-90} = -\frac{6}{90} = -\frac{1}{15}$$

Or, $f = -15 \text{ cm}$, negative sign indicates that the nature of spherical mirror is concave and its focal length is 15 cm.

23. (i) Both 24Ω resistors are in parallel combination

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{24} + \frac{1}{24} = \frac{1}{12}$$

$$R_p = 12 \Omega$$

Total resistance of the circuit $R_s = R_p + 12 = 12 + 12 = 24 \Omega$

Current through the circuit, $I = \frac{V}{R_s} = \frac{6}{24} = \frac{1}{4} = 0.25 \text{ A}$

Therefore, the current through 12Ω resistor is 0.25 A

(ii) Same readings of A_1 and A_2 , i.e. 0.25 A , as both are connected in series. Hence, difference in the readings of both ammeter is zero.

OR

(a) When 1 joule of work is done in carrying 1 coulomb of charge, from infinity to a point in the electric field, then potential at that point is called 1 volt.

(b) Potential difference, V (volt) = Work done (joule) in unit charge (Coulomb) = $\frac{W}{q}$

(c) Work = 100 J, $q = 20$ C

$$\text{Potential difference, } V = \frac{W}{q} = \frac{100}{20} = 5 \text{ V}$$

24. In scattering, the incident beam of light just get redirected into different directions after being interacted with the particles suspended in a medium/atmosphere and do not split. Dispersion is caused due to difference in velocity of each colour through a medium. It is the special case of scattering, where all wavelengths are scattered proportionately and evenly.

Rainbow is the natural phenomenon in which dispersion takes place.

Blue colour of sky, red colour of sky at sunrise or sunset is example of scattering of light.

25. (a) The pH range required by our blood is from 7.0 to 7.8. During indigestion, stomach produces too much acid which causes pain. Antacids are alkaline and so neutralise the excess acid. 1 Milk of Magnesia is an antacid.

(b) The pH will decrease. The milk when changes to curd becomes more acidic. Lesser the pH value, more is the acidic nature.

(c) Baking soda is basic in nature, when it is added to milk it increases the pH of milk, so that milk doesn't get spoilt or change into curd.

(d) Toothpastes are alkaline in nature. They neutralise the excess acid produced by bacteria in mouth.

OR

(a) The compound of calcium which is a yellowish white powder and is used for disinfecting drinking water is bleaching powder (common name).

Its chemical name is calcium oxychloride and chemical formula is CaOCl_2

Formation of bleaching powder:

When chlorine gas is allowed to pass through the slaked lime solution, it leads to the formation of bleaching powder. The chemical equation for the reaction involved is



Four uses of the bleaching powder are:

(i) It is used as an oxidising agent in many chemical industries.

(ii) It is used for bleaching cotton and linen in the textile industry, wood pulp bleaching and for bleaching washed clothes in the laundry.

(iii) It is used to prepare chloroform.

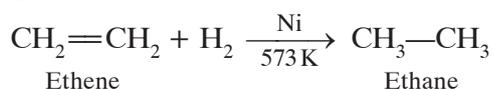
(iv) It is used as disinfectant in purification of drinking water.

(b) The chemical formula of washing soda is $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. It is named as sodium carbonate decahydrate.

Baking soda is the mixture of sodium hydrogen carbonate with acid. Here the chemical formula of "sodium hydrogen carbonate" (NaHCO_3).

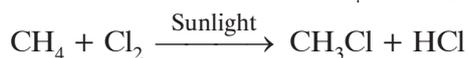
26. (a) (i) **Addition Reaction:**

It is used for converting unsaturated hydrocarbon into corresponding saturated hydrocarbon.



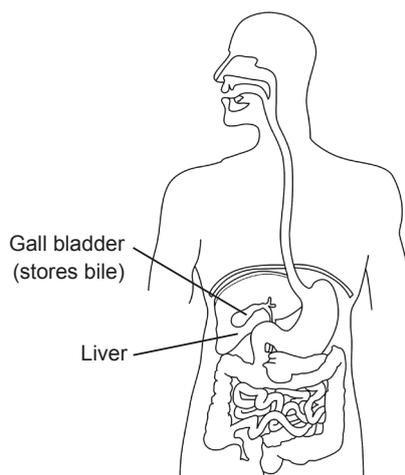
(ii) **Substitution Reaction:**

Addition of chlorine to CH_4 in the presence of sunlight



- (b) Vegetable oil is composed mostly of polyunsaturated fats while animal fat is composed mostly of monounsaturated fats. Vegetable fats contain one, or more, carbon double bonds within its structure and are therefore, unsaturated. Animal fats contain only single carbon-carbon bonds and are therefore, saturated.
- (c) Hydrogenation is a reduction reaction which results in an addition of hydrogen. If an organic compound is hydrogenated, it becomes more “saturated” with hydrogen atoms. The process typically requires the use of a catalyst, since hydrogenation only occurs spontaneously at high temperatures.

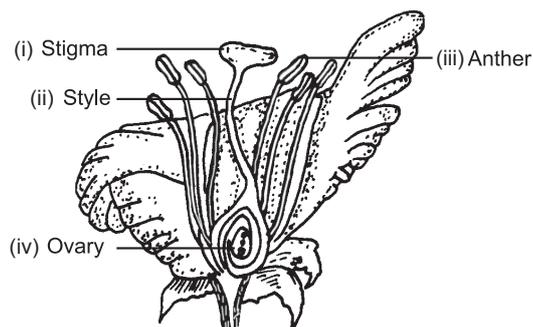
27. (a)



Alimentary Canal of Human

- (i) Bile is stored in the gall bladder.
- (ii) Bile is produced in the liver.
- (b) Enzymes present in pancreatic juice are:
- (i) Amylase which converts starch into maltose.
 - (ii) Trypsin which breaks proteins into peptones and peptides.
 - (iii) Lipase which converts emulsified fats into fatty acids and glycerol. (any one)
- (c) Peristaltic movement is the contraction and relaxation of the muscles in the food pipe which brings the food down the pipe and into the stomach.

28. (a)



- (b) Papaya flowers are called unisexual because the flowers only contain one of the two reproductive parts of the plant. Therefore, the flowers of papaya either consist of the male reproductive part, the stamens, or the female reproductive part, the carpels.
- (c) The ovule develops a tough coat and is gradually converted into a seed. The seed contains the future plant or embryo which develops into a seedling under appropriate conditions.

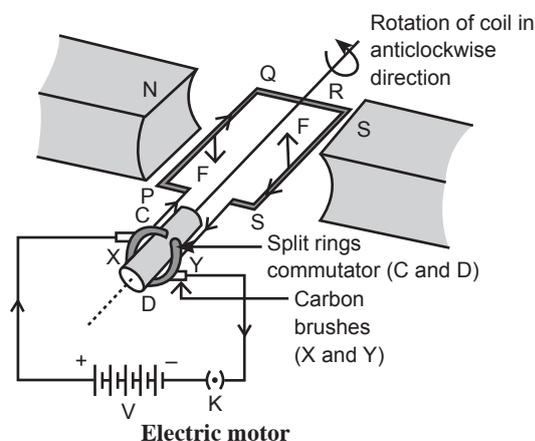
OR

- (a) The organ called testes is located outside the abdominal cavity, as it requires a lower temperature to produce sperms.
- (b) The prostate gland is a male reproductive organ and its main function is to secrete prostate fluid, one of the components of semen. Though prostate fluid is slightly acidic, another fluid in semen made by the seminal vesicles leaves semen slightly alkaline, or basic.
- (c) The differences between male germ cell and female germ cell are:

Male germ cell	Female germ cell
(i) Male germ is called 'sperm'.	(i) Female germ cell is called "ovum".
(ii) Sperm is produced by testes.	(ii) Ovum is produced by ovary.
(iii) Male germ cell is motile.	(iii) Ovum is static.

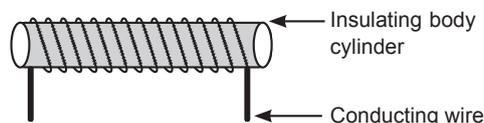
29. (a) The rule is Fleming's left hand rule. It states that "Stretch the thumb, forefinger and middle finger of the left hand mutually perpendicular to each other such that the forefinger points in the direction of the magnetic field and the middle finger points in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor."

(b) **Labelled diagram of an electric motor**



OR

- (a) **Solenoid:** A coil of many circular turns of insulated copper wire wound on a cylindrical insulating body (i.e. cardboard etc.) such that its length is greater than its diameter is called solenoid.



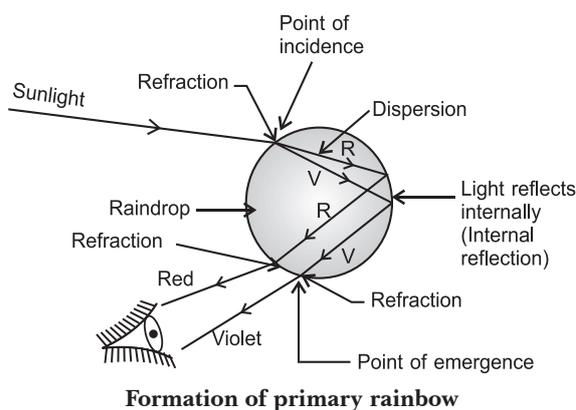
When current is flowing through the solenoid, the magnetic field line pattern resemble exactly with those of a bar magnet with the fixed polarity North and South pole at its ends and it acquires the directive and attractive properties similar to bar magnet. Hence the current carrying solenoid behaves a bar magnet.

Use of current carrying solenoid: It is used to form a temporary magnet called electromagnet as well as permanent magnet.

- (b) **Strength of the magnetic field can be increased by:**
- (i) increasing the current in the coil
 - (ii) increasing the number of coils in the solenoid; and
 - (iii) using a soft iron core within the solenoid.

30. (a) The splitting up of white light into its component colours is called dispersion.

- (b) **Rainbow:** It is an optical natural spectrum, produced by the nature in the sky, in the form of a multicoloured arc. The rainbow is formed due to the dispersion of sunlight by water droplets suspended in the atmosphere after rainfall. These water droplets act like small prisms. The Sunlight enters the water droplets. At the point of incidence, it refracts and disperses then gets reflected internally and finally gets refracted again at the point of emergence as it comes out of the rain-drop.



Therefore, due to refraction, dispersion and internal reflection of the sunlight, different colours reach the observer's eye along different paths and become distinct. It creates a rainbow in the sky.

Hence "Rainbow is an example of dispersion of sunlight."

Necessary conditions for the formation of a rainbow.

- (i) The presence of water droplets in the atmosphere, and
- (ii) The sun must be at the back of the observer, i.e. the observer must stand with his back towards the sun.

(c) The ability of the eye lens to adjust its focal length is called its accommodation.

Help by the ciliary muscles in accommodation: When we are looking at nearby object, the ciliary muscles contract, it increases the curvature of eye lens. The eye lens then becomes thicker. As a result, the focal length of the eye lens decreases in such a way that a clear sharp image of nearby object is formed on the retina. Thus, the object is seen clearly to us.

When we are looking at distant object, these muscles are in relaxed position, the eye lens becomes thinner and the focal length of the eye lens increases. Therefore, the parallel rays coming from the distant object are focussed on the retina and the object is seen clearly to us. Thus, the accommodation power of an eye helps a person to see nearby as well as distant objects clearly.