

CLASS X (2020-21)
SCIENCE (CODE 086)
SAMPLE PAPER-6

Time : 3 Hours**Maximum Marks : 80****General Instructions :**

- (i) The question paper comprises four sections A, B, C and D. There are 36 questions in the question paper. All questions are compulsory.
- (ii) Section–A – question no. 1 to 20 - all questions and parts thereof are of one mark each. These questions contain multiple choice questions (MCQs), very short answer questions and assertion - reason type questions. Answers to these should be given in one word or one sentence.
- (iii) Section–B – question no. 21 to 26 are short answer type questions, carrying 2 marks each. Answers to these questions should be in the range of 30 to 50 words.
- (iv) Section–C – question no. 27 to 33 are short answer type questions, carrying 3 marks each. Answers to these questions should be in the range of 50 to 80 words.
- (v) Section–D – question no. 34 to 36 are long answer type questions carrying 5 marks each. Answer to these questions should be in the range of 80 to 120 words.
- (vi) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (vii) Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION-A

1. Name a non-metal which is lustrous and a metal which is non-lustrous. [1]

Ans :

Iodine is a lustrous non-metal and lead is a non-lustrous metal.

or

Why does calcium float in water?

Ans :

Calcium reacts with water to form hydrogen gas. Although, calcium is heavier than water, but due to the sticking of the H₂ gas bubbles on calcium metal surface, it starts floating.

2. What type of bond is present in F₂ molecule? [1]

Ans : Covalent bond.

3. The elements *A, B, C, D* and *E* have atomic numbers 9, 11, 17, 12 and 13 respectively. Which pair of elements belongs to the same group of the periodic table? [1]

Ans : (c) *A* and *C*

4. What is the reason behind twinkling of stars? [1]

Ans :

It is due to refraction of light by the Earth's atmosphere.

5. The refractive index of diamond is 2.42. What is the meaning of this statement? [1]

Ans :

The refractive index of diamond is 2.42. This suggests that the ratio of speed of light in air and the speed of light in diamond is equal to 2.42.

6. Where should an object be placed in front of a convex

lens to get a real image of the size of the object? [1]

Ans :

The object should be placed at twice the focal length.

or

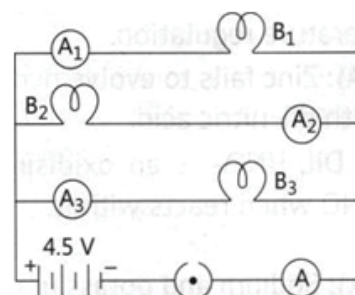
Define 1 dioptre of power of a lens.

Ans :

The power of lens can be defined as the reciprocal of its focal length. If *P* is the power of a lens of focal length *f* in metre then

$$P = \frac{1}{f(\text{in metre})}$$

7. *B*₁, *B*₂ and *B*₃ are three identical bulbs connected as shown in figure. When all the three bulbs glow, a current of 3 A is recorded by the ammeter *A*. [1]



What happens to the glow of the other two bulbs when the bulb *B*₁ gets fused?

Ans :

The glow of the bulbs *B*₂ and *B*₃ will remain the same because *B*₁, *B*₂ and *B*₃ are in parallel.

8. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of magnetic field? [1]

Ans :

Magnetic field will be parallel or antiparallel to the direction of motion of an electron.

9. What is meant by saying that the potential difference between the two points is 1 V? [1]

Ans :

It means, when 1 joule of work is done to move a charge of 1 coulomb from one point to other, the potential difference between those two points is 1 V.

$$\text{Therefore, } 1 \text{ volt} = \frac{1 \text{ joule}}{1 \text{ coulomb}}$$

$$\text{i.e., } 1 \text{ V} = 1 \text{ J C}^{-1}$$

or

Write SI unit of resistivity.

Ans :

SI unit of resistivity is ohm-metre.

10. What is the role of the acid in our stomach? [1]

Ans :

Role of the Acid (HCl) :

- Kills maximum germs present in the food.
- Makes the food acidic, so that pepsin can digest protein molecules.

11. Why do the walls of trachea not collapse when there is less air in it? [1]

Ans :

The walls of trachea do not collapse when there is less air in it because of the presence of rings of cartilage.

or

What is the range of normal blood pressure (systolic/diastolic)?

Ans : 120/80 mm of Hg.

12. Name any two man-made ecosystems. [1]

Ans :

Garden and crop fields are two man-made ecosystems.

or

Select two non-biodegradable substances from the following wastes generated in a kitchen:

Spoiled food, paper bags, milk bags, vegetable peels, tin cans, used tea leaves.

Ans : Milk bags and tin cans.

13. Name the part of Bryophyllum where the buds are produced for vegetative propagation. [1]

Ans :

Leaf is the vegetative part which is used for the vegetative propagation of Bryophyllum.

For question numbers 14, 15 and 16, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below :

- Both A and R are true and R is correct explanation of the assertion.
- Both A and R are true but R is not the correct explanation of the assertion.
- A is true but R is false.
- A is false but R is true.

14. **Assertion :** It is necessary to separate oxygenated and deoxygenated blood in mammals and birds.

Reason : Mammals and birds are warm blooded animals and they depend on environment for their body temperature regulation. [1]

Ans : (c) A is true but R is false.

15. **Assertion :** Zinc fails to evolve hydrogen gas on reacting with dil. nitric acid.

Reason : Dil. HNO_3 is an oxidising agent and zinc gives NO when reacts with it. [1]

Ans : (c) A is true but R is false.

or

Assertion : Sodium and potassium are stored in kerosene oil.

Reason : Sodium and potassium belongs to group IA, so they are alkali metals.

Ans : (b) Both A and R are true but R is not the correct explanation of A.

16. **Assertion :** Biological magnification is the process in which harmful chemicals enter a food chain and get accumulated progressively at each trophic level.

Reason : Biological magnification affect organisms belonging to different trophic levels particularly the tertiary consumers. [1]

Ans : (b) Both A and R are true but R is not the correct explanation of A.

17. **Read the following and answer any four question 17.1 to 17.5.** 1×4

Naren was participating in a marathon. He was running at position two, right from the beginning. Just when he was nearing the finishing line, he started running even faster so as to stand first. And when he was about to win the marathon, he got a severe muscle cramp in his leg. This cramp prevented Naren from running any further and shattered his dream of winning the marathon.

17.1 The process which provides most of the energy to Naren for running the marathon is:

- anaerobic Respiration
- aerobic Respiration
- breathing
- fermentation

Ans : (b) aerobic respiration

17.2 The process which provides a little extra energy to Naren for running very fast towards the end of race is:

- anaerobic respiration
- aerobic respiration
- breathing
- fermentation

Ans : (a) anaerobic respiration

17.3 The substance which gets accumulated in the leg muscles of Naren that causes muscle cramp is:

- pyruvate
- ethanol
- carbon dioxide
- lactic acid

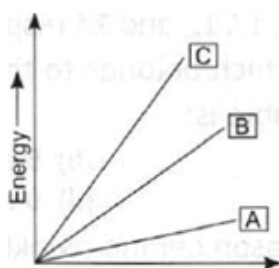
Ans : (d) lactic acid

17.4 Which of the following is correct for the process of anaerobic respiration?

	Carbon dioxide always produced	A lot of energy is released
(a)	Yes	No
(b)	No	Yes
(c)	No	No
(d)	Yes	Yes

Ans : (c) No, No

17.5 Based on the data represented in the graph below, among A, B and C the products of respiration in C is likely to be:



- (a) Alcohol + CO₂ + 38 ATP
- (b) Lactic Acid + CO₂ + 2 ATP
- (c) Alcohol + CO₂ + 2 ATP
- (d) CO₂ + H₂O + 38 ATP

Ans : (d) CO₂ + H₂O + 38 ATP

18. Read the following and answer any four question 18.1 to 18.5. 1 × 4

Chemistry is one of the most sophisticated branches of science, would not have been the same if Russian scientist Dmitri Ivanovich Mendeleev had not come up with the periodic table on March 6, 1869. Until 1863, the world was aware of only 56 known elements. The rate of scientific progress was such that every year, a new element was being discovered. It was during this time that Mendeleev came up with the idea of the periodic table. He published the periodic table in his book- "The Relation between the Properties and Atomic Weights of the Elements". He had found a definitive pattern following which each element could be placed according to their atomic weight. He noticed that elements that are similar in their similar chemical properties either had the atomic weight or had a regular increase. He also predicted the properties of the missing (yet to be discovered) elements and gave them Sanskrit names.

18.1 Which of the following statement about the Mendeleev's periodic table is correct?

- (a) It has 8 vertical columns known as groups.
- (b) It has 18 horizontal rows known as periods.
- (c) It has 7 horizontal rows known as groups.
- (d) It has 18 vertical columns known as periods.

Ans : (a) It has 8 vertical columns known as groups.

18.2 According to Mendeleev's periodic law, the elements were arranged in the periodic table in the order of:

- (a) decreasing atomic numbers
- (b) increasing atomic numbers
- (c) decreasing atomic masses

(d) increasing atomic masses

Ans : (d) increasing atomic masses

18.3 In Mendeleev's periodic table, gaps were left for the elements to be discovered later on. An element which found a vacant place in the periodic table later on is:

- (a) Se
- (b) Ge
- (c) Si
- (d) Be

Ans : (b) Ge

18.4 Gallium was named by Mendeleev as:

- (a) Eka-aluminium
- (b) Eka-silicon
- (c) Eka-germanium
- (d) Eka-zinc

Ans : (a) Eka-aluminium

18.5 Which of the following statement is correct in regard to Mendeleev's periodic table?

- I. Position of isotopes could not be explained.
 - II. It is true for elements upto calcium only.
 - III. It could accommodate noble gases when they were discovered.
 - IV. It assigned correct position to hydrogen.
- (a) I and II only
 - (b) I and III only
 - (c) I, II and III
 - (d) IV only

Ans : (b) I and III only

19. Read the following and answer any four question 19.1 to 19.5. 1 × 4

The triangular glass prism is a transparent object made of glass having two triangular ends and three rectangular sides. The opposite faces of a triangular glass prism are not parallel to one another.

When a ray of light passes through a prism, it bends towards the base of prism as shown in figure below. But when white light consisting of seven colours falls on a glass prism, each colour in it is refracted by a different angle, with the result that seven colours are spread out to form a spectrum. The red colour is deviated the least and the violet colour is deviated the maximum.

19.1 Angle of deviation in a prism is the angle between:

- (a) incident and reflected ray
- (b) reflected and emergent ray
- (c) incident and emergent ray
- (d) incident and refracted ray

Ans : (c) incident and emergent ray

19.2 Which of the following phenomena of light are involved in the formation of a rainbow?

- (a) Reflection, refraction and dispersion
- (b) Refraction, dispersion and total internal reflection
- (c) Refraction, dispersion and internal reflection
- (d) Dispersion, scattering and total internal reflection

Ans : (c) Refraction, dispersion and internal reflection

19.3 Which of the following coloured light has the least speed in glass prism?

- (a) violet
- (b) yellow
- (c) red
- (d) green

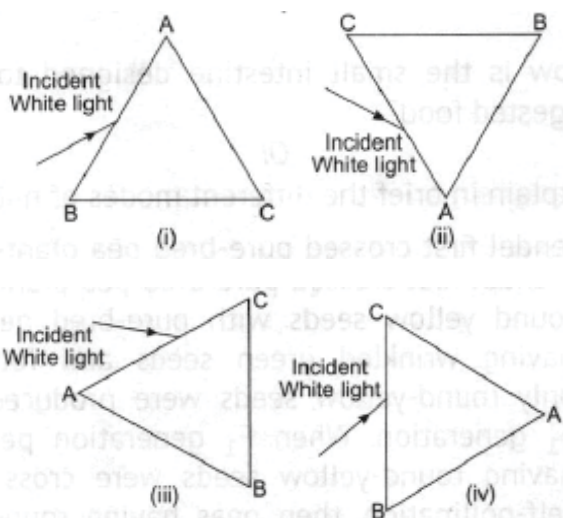
Ans : (a) violet

19.4 The colour of light which undergoes least bending on passing through the glass prism is:

- (a) green
- (b) violet
- (c) red
- (d) blue

Ans : (c) red

19.5 Based on the different orientations of a prism ABC given below, in which of the following cases, after dispersion, the third colour from the top corresponds to the colour of the sky?



- (a) (i)
- (b) (ii)
- (c) (iii)
- (d) (iv)

Ans : (b) ii

20. Read the following and answer any four question 20.1 to 20.5. 1 × 4

The solenoid is a long coil containing a large number of close turns of insulated copper wire. When an electric current is passed through the solenoid, it produces a magnetic field around it. The magnetic field produced by a current-carrying solenoid is similar to the magnetic field produced by a bar magnet. The magnetic field lines inside the solenoid are in the form of parallel straight lines. This indicates that the strength of magnetic field is the same at all the points inside the solenoid. One end of the current-carrying solenoid acts like a north-pole (N-pole) and the other end as a south pole (S-pole). So, if a current-carrying solenoid is suspended freely, it will come to rest pointing in the north and south directions (just like a freely suspended bar magnet).

The strength of magnetic field produced by a current carrying solenoid depends on:

The number of turns in the solenoid. Larger the number of turns in the solenoid, greater will be the magnetism produced.

The strength of current in the solenoid. Larger the current passed through solenoid, stronger will be the magnetic field produced.

The nature of “core material” used in making solenoid. The use of soft iron rod as core in a solenoid produces the strongest magnetism.

20.1 The strength of magnetic field due to a solenoid depends on the:

- (a) number of turns in the solenoid
- (b) strength of current in the solenoid
- (c) nature of core material
- (d) all of the above

Ans : (d) all of the above

20.2 For a current in a long straight solenoid N and S-poles are created at the two ends. Among the following statements, the incorrect statements is:

- (a) The field lines inside the solenoid are in the form of straight lines which indicates that the magnetic field is the same at all points inside the solenoid
- (b) The strong magnetic field produced inside the solenoid can be used to magnetise a piece of magnetic material like soft iron, when placed inside the coil
- (c) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet
- (d) The N-and S-poles exchange position when the direction of current through the solenoid is reversed

Ans : (c) The pattern of the magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet

20.3 If the direction of current in the coil at one end of an electromagnet is clockwise. This end of the electromagnet will be:

- (a) west pole
- (b) north pole
- (c) south pole
- (d) east pole

Ans : (b) north pole

20.4 A soft iron bar is inserted inside a current-carrying solenoid. The magnetic field inside the solenoid:

- (a) will decrease
- (b) will become zero
- (c) will remain the same
- (d) will increase

Ans : (d) will increase

20.5 The magnetic field lines in the middle of the current-carrying solenoid are:

- (a) parallel to the axis of the tube
- (b) perpendicular to the axis of the tube
- (c) spirals
- (d) circles

Ans : (a) parallel to the axis of the tube

SECTION-B

21. How is the small intestine designed to absorb digested food? [2]

Ans :

The small intestine has millions of tiny finger-like projections called villi. The main function of villi is the absorption of food. The villi increase the surface area for food absorption. Within these villi, many blood vessels are also present that absorb the digested food and carry it to the blood stream. From the blood stream, the absorbed food is transported to each and every cell of the body.

or

Explain in brief the different modes of nutrition.

Ans :

Nutrition is of two types:

- (i) **Autotrophic Nutrition** : Mostly green plants have

the ability to manufacture their own organic food due to the presence of chlorophyll. They take up CO_2 and H_2O and manufacture carbohydrates in the presence of sunlight process, called as photosynthesis. Such organisms are called autotrophs and their mode of nutrition is called autotrophic.

(ii) **Heterotrophic Nutrition :** In this type of nutrition, the animals derive organic food material by consuming bodies or products of other living or dead plants or animals.

22. Mendel first crossed pure-bred pea plants having round yellow seeds with pure-bred pea plants having wrinkled green seeds and found that only round-yellow seeds were produced in the F_1 generation. When F_1 generation pea plants having round-yellow seeds were cross-bred by self-pollination, then peas having round yellow seeds, round green seeds, wrinkled-yellow seeds and wrinkled-green seeds were produced. Mendel collected a total of 2224 seeds.

What will be the number of (i) round yellow seeds and (ii) wrinkled-green seeds? [2]

Ans :

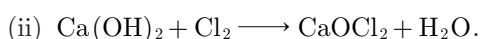
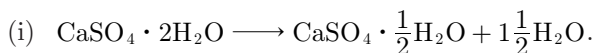
(i) Number of round yellow seeds = $\frac{2224}{16} \times 9 = 1251$

(ii) Number of wrinkled-green seeds = $\frac{2224}{16} \times 1 = 139$

23. Complete the following table : [2]

	Plaster of Paris	Bleaching Powder
Chemical equation for its formation	(i)	(ii)
Use	(iii)	(iv)

Ans :



(iii) It is used for making toys.

(iv) It is used as disinfectant.

or

Which among the following changes are exothermic or endothermic in nature?

- (i) Decomposition of ferrous sulphate.
- (ii) Dilution of sulphuric acid.
- (iii) Dissolution of sodium hydroxide in water.
- (iv) Dissolution of ammonium chloride in water.

Ans :

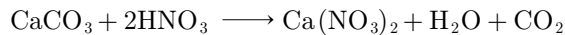
(ii) and (iii) are exothermic as heat is released in these reactions.

(i) and (iv) are endothermic as heat is absorbed in these reactions.

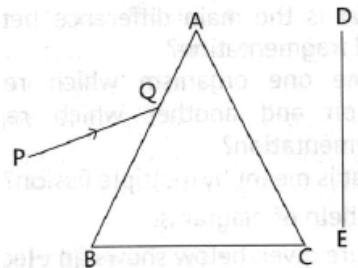
24. What happens when nitric acid is added to egg shell? [2]

Ans :

Egg shell contains calcium carbonate. When nitric acid is added to it, carbon dioxide gas is evolved. The reaction can be given as:

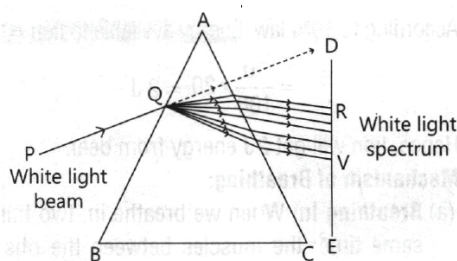


25. A narrow beam PQ of white light is passing through a glass prism ABC as shown in the diagram. Trace it on your answer sheet and show the path of the emergent beam as observed on the screen DE . Write the name and cause of the phenomenon observed. [2]

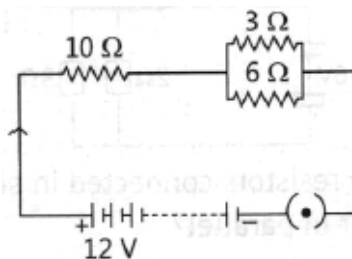


Ans :

The phenomenon of splitting of white light into its constituent colours is called dispersion of light. The cause behind this phenomenon is that different constituent colours of light travel with different speeds in the medium other than air/vacuum and bend through different angles.



26. Consider the circuit shown in the diagram. Find the current in 3Ω resistor. [2]



Ans :

3Ω and 6Ω are connected in parallel.

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{3} + \frac{1}{6} = \frac{1}{2}$$

$$R_p = 2\Omega$$

R_p and 10Ω are connected in series.

Hence, total amount of resistance,

$$R_s = R_p + R_3 = 2 + 10 = 12\Omega$$

Total current in the circuit,

$$I = \frac{V}{R_s} = \frac{12}{12} = 1\text{ A}$$

SECTION-C

27. Explain the following methods of contraception giving one example of each:

- (i) Barrier method.
- (ii) Hormonal imbalance method.

(iii) Surgical method. [3]

Ans :

- (i) **Barrier Method :** In this method, physical devices such as condoms, diaphragm and cervical caps are used. These devices prevent the entry of sperm in the female genital tract during copulation and thus act as a barrier between them.
- (ii) **Hormonal Imbalance Method :** In this method, specific drugs are used by females. which are of two types: oral pills and vaginal pills. Oral pills contain hormones which stop the ovaries from releasing ovum into the fallopian tube. These pills are also called Oral Contraceptives (OCs) which act by changing the hormonal balance of the body, so that eggs are not released and fertilisation does not occur.
- (iii) **Surgical Method :** In this method, a small portion of vas deferens in male and the fallopian tube in females is surgically removed or tied. It is called vasectomy in males and tubectomy in females. In this case, if the vas deferens in the males is blocked, the sperm transfer will be prevented and if the fallopian tube in the females is blocked, the egg will not be able to reach the uterus, thus fertilisation will not take place.

or

What is placenta? Describe its structure. State its functions in case of pregnant human female.

Ans :

Placenta is a special tissue that helps the human embryo in obtaining nutrition from mother's blood.

Structure :

Placenta is a disc-like structure embedded in the uterine wall.

- (i) It contains villi on the side of the embryo.
- (ii) It contains blood spaces on mother's side, which surround the villi.

Functions :

- (i) It provides a large surface area for glucose and O₂ to pass from mother's blood to the embryo.
- (ii) It also removes metabolic wastes from the embryo to mother's blood.

28. Calculate the amount of energy available to lion in the following food chain if plants have 20,000 J of energy available from the sun. [3]

Plants → Deer → Lion

Ans :

Sun → Plants → Deer → Lion.

20,000 J

1% absorbed

Plants can trap only 1% of the sun's energy.

So, energy available to plants = 1% of 20,000 J

$$= \frac{1}{100} \times 20000 = 200 \text{ J}$$

According to 10% law, Energy available to deer = 10% of 200 J

$$= \frac{10}{100} \times 200 = 20 \text{ J}$$

According to 10% law, Energy available to lion = 10% of 20 J

$$= \frac{10}{100} \times 20 = 2 \text{ J}$$

Hence, lion will get 2 J energy from deer.

29. Explain the mechanism of breathing in humans. [3]

Ans :

Mechanism of Breathing :

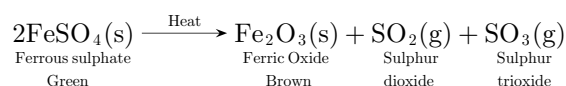
- (i) **Breathing In :** When we breathe in, two things happen at the same time: the muscles between the ribs contract causing the ribcage to move upward and outward and the diaphragm contracts and moves downward. Due to this, the chest cavity becomes larger and air is sucked in from outside the lungs.
- (ii) **Breathing Out :** When we breathe out. even then two things happen at the same time: the muscles between the ribs relax causing the ribcage to move downward and inward and the diaphragm relaxes and moves upward. Due to this, chest cavity becomes smaller and air is pushed out from the lungs.

30. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity. [3]

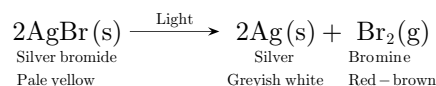
Ans :

Equation for decomposition reactions carried out

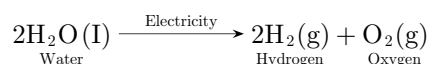
(i) **By Heat :**



(ii) **By Light :**



(iii) **By Electricity :**

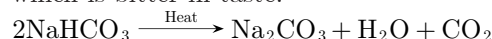


31. For making cake, baking powder is taken. If at home your mother uses baking soda instead of baking powder in cake:

- (i) How will it affect the taste of the cake and why?
- (ii) How can baking soda be converted into baking powder?
- (iii) What is the role of tartaric acid added to baking soda? [3]

Ans :

(i) Baking soda is sodium hydrogen carbonate. On heating, it is converted into sodium carbonate which is bitter in taste.



Thus, baking soda will give a bitter taste to cake.

(ii) Baking soda can be converted into baking powder by the addition of appropriate amount of tartaric acid to it.

(iii) The role of tartaric acid is to neutralise sodium carbonate so that the cake will not taste bitter.

32. Give reason for the following: [3]

- (i) Element carbon forms compounds mainly by covalent bonding.
- (ii) Diamond has a high melting point.

(iii) Graphite is a good conductor of electricity.

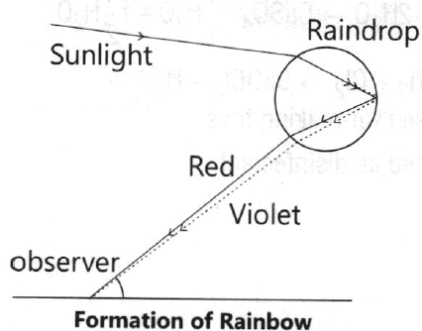
Ans :

- (i) 'C' cannot lose four electrons as very high energy is needed. It cannot gain 4 electrons because 6 protons cannot hold 10 electrons but it can share four electrons easily. Therefore, it forms covalent bond.
- (ii) It is because diamond is hard due to strong C – C bonds and has compact structure.
- (iii) It has free electrons. so it is a good conductor of electricity.

33. When and where do we see a rainbow? How is a rainbow formed? Draw a labelled diagram to illustrate the formation of a rainbow. [3]

Ans :

Rainbow can be seen during rainfall. It is always formed in a direction opposite to that of the sun. When light rays fall on the droplets, they disperse into their constituent colours and due to total internal reflection of this dispersed light, it again refracts and we see the rainbow opposite to the sun.



SECTION-D

- 34.** (i) The way metals like sodium, magnesium and iron react with air and water is an indication of their relative positions in the 'reactivity series'. Is this statement true? Justify your answer with examples.
- (ii) What will you observe when:
- (a) Some zinc pieces are put in copper sulphate solution.
 - (b) Some silver pieces are put into green coloured ferrous sulphate solution.
- (iii) Which of the following metals will melt at body temperature?
Gallium, Magnesium and Caesium. [5]

Ans :

- (i) Yes, sodium reacts explosively with cold water, it is most reactive. Magnesium reacts with hot water, it is less reactive than sodium. Iron reacts only with steam which shows that iron is least reactive and sodium is most reactive among the three.
- (ii)
- (a) The blue solution of copper sulphate will become colourless and there will be a deposition of reddish-brown copper metal.
- $$\text{Zn(s)} + \text{CuSO}_4(\text{aq}) \longrightarrow \text{ZnSO}_4(\text{aq}) + \text{Cu(s)}$$
- Blue
Colourless
Reddish – brown

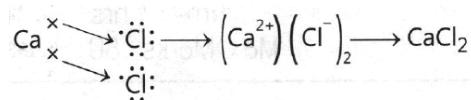
- (b) No reaction will take place as Ag is less reactive than iron.
 $\text{Ag(s)} + \text{FeSO}_4(\text{aq}) \longrightarrow \text{No reaction}$
- (iii) Gallium and Caesium will melt at body temperature.

or

- (i) Write electron dot diagram for chlorine (At. no. 17) and calcium (At. no. 20). Show the formation of calcium chloride by transfer of electrons.
- (ii) Identify the nature of above compound and explain three physical properties of such compound.

Ans :

- (i) Cl – 2, 8, 7
 Ca – 2, 8, 8, 2
 $\text{Ca} \longrightarrow \text{Ca}^{2+} + 2\text{e}^-$
 $2\text{Cl} + 2\text{e}^- \longrightarrow 2\text{Cl}^-$



- (ii) The given compound is an ionic compound. The physical properties of this compound are:
 - (a) It is hard and solid.
 - (b) It has high melting and boiling points.
 - (c) It is soluble in water.
- 35.** (i) What is the main difference between fission and fragmentation?
 (ii) Name one organism which reproduces by fission and another which reproduces by fragmentation?
 (iii) What is meant by multiple fission? Show it with the help of diagrams. [5]

Ans :

- (i) In fission a unicellular organism splits into two or more daughter organisms, whereas in fragmentation, a multicellular organism breaks up into two or more daughter organisms.
- (ii) Amoeba reproduces by fission whereas Spirogyra reproduces by fragmentation.
- (iii) In multiple fission, the nucleus of parent organism splits or divides repeatedly to form many new organisms of similar size. Plasmodium reproduces by this method.

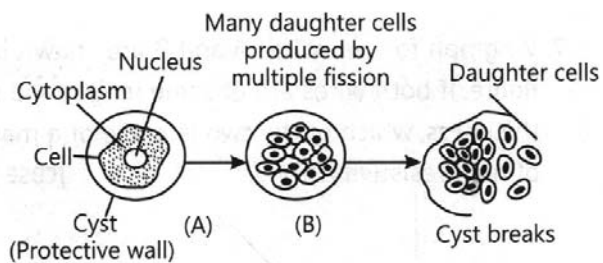
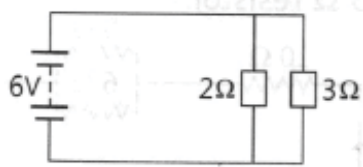


Figure: Reproduction by Multiple Fission.

36. The figure given below shows an electric circuit in which current flows from a 6 V battery through two

resistors.

[5]



$$W = H = I^2 R t$$

Heating effect of electric current is desirable because it is useful for the functioning of electrical bulbs, etc., and undesirable because it leads to unnecessary loss of energy in the form of heat.

- (i) Are the resistors connected in series with each other or in parallel?
- (ii) For each resistor state the potential difference across it.
- (iii) The current flowing from the battery is shared between the two resistors. Which resistor will have bigger share of the current?
- (iv) Calculate the effective resistance of the two resistors.
- (v) Calculate the current that flows from the battery.

Ans :

- (i) In parallel.
- (ii) 6 V (as in parallel combination potential difference remains the same).

(iii)
$$I = \frac{V}{R}$$

Hence, 2 Ω resistor will have bigger share of the current.

(iv)
$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R} = \frac{1}{3} + \frac{1}{2} = \frac{2+3}{6} = \frac{5}{6}$$

$$R = \frac{6}{5} = 1.2 \Omega$$

(v)
$$I = \frac{V}{R} = \frac{6}{1.2} = 5 \text{ A}$$

or

Obtain an expression for the heat produced in a conductor when a voltage V is applied across it. Heating effect of electric current is desirable as well as undesirable. Explain this statement.

Ans :

When an electric charge q moves against a potential difference V , then the amount of work done is given by

$$W = q \times V \quad \dots(1)$$

We also know that,

$$I = q/t$$

$$q = I \times t \quad \dots(2)$$

and from Ohm's law,

$$V = IR \quad \dots(3)$$

Putting the values of equation. (2) and (3) in equation (1), we get

$$W = I \times t \times I \times R$$

Work done,
$$W = I^2 R t$$

Assuming that all the electrical work done or all the electrical energy consumed is converted into heat energy.

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