Solution

Class 10 - Science

2020-2021 - Paper-6

Section A

1. The substance (atom, ion or molecule) that gains electrons and is thereby reduced to a low valency state is called an oxidising agent, while the substance that loses electrons and is thereby oxidised to a higher valency state is called a reducing agent.
   $2Na + Cl_2 \rightarrow 2NaCl$
   Oxidizing agent : Cl_2
   Reducing agent : Na

   OR

   Zinc carbonate $\rightarrow$ Zinc oxide + Carbon dioxide.
   $ZnCO_3 \rightarrow ZnO + CO_2$
2. Corrosion - It is a process of slow and gradual conversion of a metal into its undesirable compounds by the attack of air and moisture present in the atmosphere.Green coating on copper and black coating on silver are examples of corrosion.
   Rancidity - When the food items are kept for a long period, the fats and oils present in them get oxidised and their smell and taste change. They become rancid and so the process is called rancidity.
3. **(a)** 5% – 8% acetic acid in water
   Explanation: A 5% - 8% solution of acetic acid in water called vinegar.
4. (a) - ve, and (b) + ve.
5. As red light is scattered the least and it covers longer distances. That's why it is used in danger signal.
6. Rain water is slightly acidic having pH value of 5.6. The colour of pH paper will be yellowish green.

   OR

   Distilled water has pH=7. Since the pH is decreasing on adding X, it should be an acid .
7. Resistance of a conductor is inversely proportional to its area cross-section. As resistivity increases area decreases and as area increases, resistivity decrease.
8. The earth wire carries the charges develop on the appliances immediately to earth, thus saving the life of the human.
9. A closed path is required for the flow of current so that charges can move in a particular direction in a given circuit. But if path is not closed means circuit is open, then there is air between the gap, and we know that air is an insulator for flow of charges, so the current stop flowing in the circuit.

   OR

   Given, I = 1A and t = 16s
   We know that,
   $I = \frac{q}{t} = \frac{ne}{t}$ [$\because$ q = ne]
   $\Rightarrow \quad n = \frac{I \times t}{e} = \frac{1 \times 16}{1.6 \times 10^{-19}}$ [$\because$ e = 1.6 $\times$ 10^{-19}C]
   = 10^{20} electrons will flow through the conducting wire,when 1A current is passed through it for 16 seconds .
10. Raw materials required for photosynthesis are-
    a) Carbon dioxide
    b) Water
    c) Chlorophyll and Sunlight
11. (i) Cork should be a airtight.
    (ii) A small tube with freshly prepared KOH solution should be placed in the flask.

    OR

    (i) Plant produces carbon dioxide as wastes during respiration and oxygen as waste during photosynthesis.
    (ii) Excess of water in plants is removed through transpiration.
    (iii) Some waste products like gums and resins are stored in older xylem tissue.
12. According to law if 5 J of energy is available to man then 10% energy is available to primary consumer so primary consumer is filled with 50J. Producers consume only 1% of energy which is available from sun

therefore 5000J of energy is available to the producers.

OR

The third trophic level is always occupied by carnivores that feed on herbivores which feed on Plants (producers or autotrophs) who occupy the first trophic level. Large carnivores occupy the fourth trophic level depending on carnivores at third level.

13. The circulatory system will become inefficient if it develops a leak. This could be avoided by maintaining a normal blood pressure.

14. **(a)** Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
Explanation: Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.

15. **(a)** A is true but R is false.
Explanation: A is true but R is false.

OR

(a) Both A and R are true and R is correct explanation of the assertion.
Explanation: Both A and R are true and R is correct explanation of the assertion.

16. **(a)** Both A and R are true and R is correct explanation of the assertion.
Explanation: Both A and R are true and R is correct explanation of the assertion.

17. i. (d) conversion of pyruvate to lactic acid
ii. (c) Only Carbon dioxide(yes)
iii. (a) Lack of oxygen
iv. (b) To stop air from getting in
v. (a) Milky

18. i. (b) Carbonic acid
ii. (c) Baking soda
iii. (c) $NaHCO_3$
iv. (b) $Ca(OH)_2$
v. (a) Washing soda

19. i. (a) $V_1 + V_2 + V_3$
ii. (a) Same in every point of circuit
iii. (a) W = VIT
iv. (a) 1 ohm
v. (d) $\frac{15}{2}\Omega$

20. i. (a) Bromine
ii. (a) calcium
iii. (d) $CuSO_4$ + Fe
iv. (c) Both (a) and (b)
v. (b) iodine

Section B

21. A respiratory pigment is a chemical substance which can combine with oxygen in lungs where the partial pressure of oxygen is more and releases oxygen in the tissue where partial pressure of oxygen is less (e.g. Haemoglobin)

OR

Difference between aerobic and anaerobic respiration:

Aerobic respiration	Anaerobic respiration
(i) Takes place in presence of oxygen.	(i) Takes place in absence of oxygen.
(ii) Complete oxidation of glucose occurs.	(ii) Incomplete oxidation of glucose occurs.
(iii) More energy is produced.	(iii) Less energy is produced.

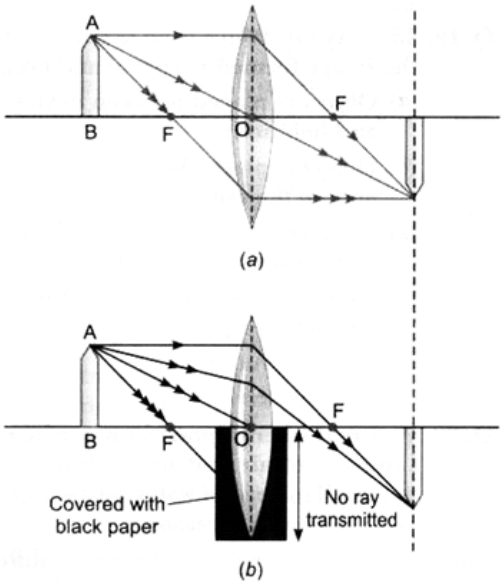
Anaerobic respiration takes place in yeast, some bacteria and some internal parasites like tapeworm.

Anaerobic respiration also takes place in our muscles during vigrous exercise to meet the energy demands of the body.

22. Pharynx is a common chamber for food and air, but food passes into food pipe through gullet as entry into larynx (wind pipe) is checked by epiglottis. It acts like a trap door, shuts the opening of larynx. So, food does not enter the wind pipe.
23. Saturated hydrocarbons like methane, ethane and propane etc undergoes complete combustion due to their high hydrogen content then carbon content and hence, these saturated compounds burn with a blue flame as in LPG.

    In case of unsaturated hydrocarbons like ethene, propene, ethyne etc, due to their low hydrogen content, there is incomplete combustion takes place. So, unsaturated hydrocarbons burn with a sooty flame and saturated hydrocarbons burns with blue flame.
24. The compound X is sodium bicarbonate or sodium hydrogen carbonate. Its formula is ($NaHCO_3$)

    The reaction involved is:

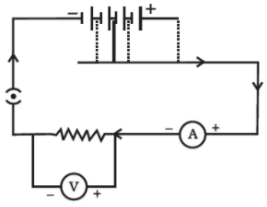
    $2NaHCO_3\ (s) \xrightarrow{Heat} Na_2CO_3(s) + H_2O(l) + CO_2 \uparrow$
25. 

    Yes, even when one-half of a convex lens is covered with a black paper, the lens will produce a complete image.

    Take a live candle, keep it in front of a convex lens mounted on an optical bench.

    Move the candle along the axis of bench and take its full image on a screen. Now cover the lower half of lens with a black paper without changing the positions of candle, lens and screen.

    You will observe that full image of candle is still seen on the screen, but the intensity of image is reduced. The reason is that a large number of rays incident on the lens are blocked. In the case of covered lower half of lens with black paper, the rays that are emerging from candle and incident on lens are refracted from upper part only and form the full image.
26. Correct diagram is as follows:

27. Acquired traits are those which are acquired by an individual during its lifetime. They are not inherited because they don't change the genetic makeup of an individual.

    OR

    i. If two groups of organisms do not undergo reproduction, which forms the basis of reproduction. There will be no evolutionary process. As no genes are exchanged. And no new set of genes are created.
    If there is no exchange of genes between members of the species, life will become stagnant as old generations die and no new species is present, thus making the organisms of that species extinct.

ii. Diverse form of life occur on Earth due to the evolutionary process.
Classification is the arrangement of organisms into various groups and subgroups on the basic of certain similarities and dissimilarities found in them determined by character present in the organism. Based on these observations, organism are placed in a hierarchy that defines and brings out their relationships. These include the ancestral and derived features (features developed due to the evolutionary changes, basic body degine).

28. i. Vultures belong to category of Scavengers.
ii. Helps in the recycling of nutrients in nature by eating dead and decaying animals.
iii. Vultures are positioned as tertiary or quaternary consumers in the food chain i.e. the topmost comsumer.

29. Differences between excretion and egestion are as follow:

Excretion	Egestion
It is the the process of eliminating waste matter. or removal of metabolic liquid wastes from the human body	**Egestion** is the discharge or expulsion of undigested material (food) from a cell in case of unicellular organisms, and from the digestive tract via the anus in case of multicellular organisms
It is associated with kidneys, lungs and skin.	It is associated with alimentary canal.

30. Hydrogen gas and Iron chloride are produced.
$2HCl\ (aq) + Fe(s) \rightarrow FeCl_2\ (aq) + H_2(g)$

This is a redox reaction
$Fe(0) - 2e^- \rightarrow Fe(II)$ oxidation loss of electrons

$2H^+ + 2e^- \rightarrow H_2$ reduction: gain of electrons

So it is certainly a chemical reaction: bonds are broken and made.
HCl is not a sufficiently strong oxidizing agent to produce $FeCl_3$ (need Cl2).

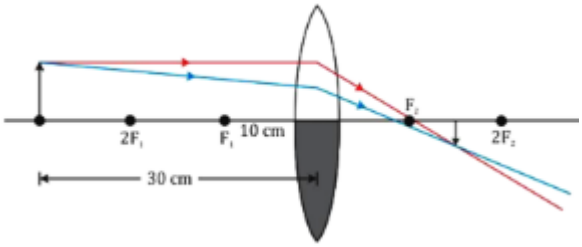
31. Suppose P and Q the first two elements of 3rd period. We can guess the electronic cofiguration and name of the element based on its position in the periodic table. The element P is sodium (Na) with atomic number 11 and electronic configuration 2,8,1 and element Q is magnesium (Mg) with atomic number 12 and electronic configuration 2,8,2.
Then comparison of their characteristics is as follows:

Characteristics	P	Q
(i) The number of electrons	11	12
(ii) Sizes of atoms	larger	Smaller
(iii) Metallic character	Higher	Lesser
(iv) Tendencies to lose electrons	Higher	Lower
(v) Formula of their oxides	P_2O	QO
(vi) Formula of their chlorides	PCI	QCl_2

32. i. Germanium has replaced Eka-silicon and gallium has replaced Eka-aluminium.
ii. Germanium — Group 14, Period 4
Gallium — Group 13, Period 4
iii. Germanium is a metalloid while Gallium is a metal..
iv. In germanium, the number of valence electrons is 4 and in gallium it is 3.

33. It is called presbyopia. It can be corrected by using two separate lenses, one for near vision and the other for distant vision.

34. When a convex lens is covered half with black paper as shown in diagram, then image of full object will formed , but it will be of less intensity and brightness.



As h_0 = 4 cm, f = 20 cm and u = - 15 cm

By lens formula,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$\Rightarrow \frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{20} + \frac{1}{(-15)} = \frac{15-20}{300} = \frac{-5}{300}$

$\therefore \quad v = -60cm$

As, magnification,

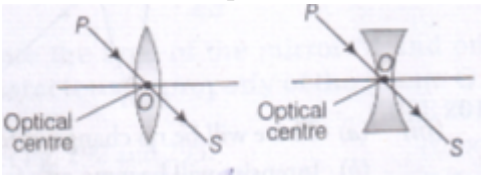
m = $\frac{h_i}{h_0} = \frac{v}{u}$

$\Rightarrow h_i = h_0 \times \frac{v}{u} = 4 \times \frac{-60}{-15} = 16\ cm$

Image formed is virtual, erect and magnified.

OR

i. The centre point of a lens is known as its optical centre. The optical centre is a point within the lens, directed to which incident rays refract without any deviation in the path whether it is convex lens or concave lens as represented below:



ii. Given, there is a divergent lens(concave lens.)

Given, f =-20cm, h_0 =4 cm , v = -10 cm

$\because$ By lens formula,

$\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$\Rightarrow \quad \frac{-1}{10} - \frac{1}{u} = \frac{-1}{20}$

$\Rightarrow \quad \frac{1}{u} = \frac{-1}{10} + \frac{1}{20} \Rightarrow \frac{1}{u} = \frac{-2+1}{20}$

$\Rightarrow$ u = - 20 cm

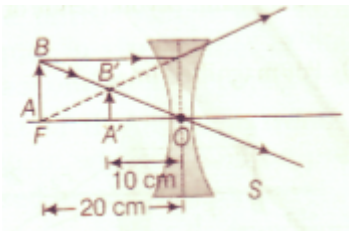
$\therefore$ Magnification, m $= \frac{v}{u} = \frac{h_i}{h_0}$

$\Rightarrow \frac{h_i}{4} = \frac{-10}{-20}$

$\Rightarrow$ h_i = 2 cm

Size of the image, h_i = 2 cm

iii.



Thus, the object is placed at 20 cm from the concave lens.

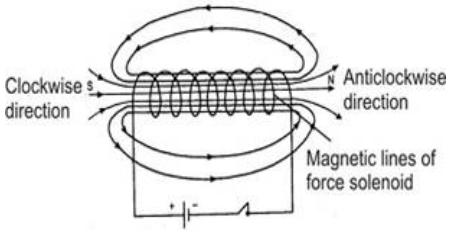
35. Differences between asexual and sexual reproduction are:

Asexual reproduction	Sexual reproduction
i. In this type of reproduction, the offspring arises from a single parent.	i. The offspring arises from two parents of different sexes.

ii. Gametes formation does not take place.	ii. Gametes formation takes place.
iii. No variation occurs.	iii. Many variations occur during sexual reproduction.

In sexual reproduction, offspring have a lot of variation because the DNA of both individuals (male and female) gets combine. Due to a lot of variations, sexual reproduction allows species to change to more advanced forms from one generation to the next and speed up evolution.

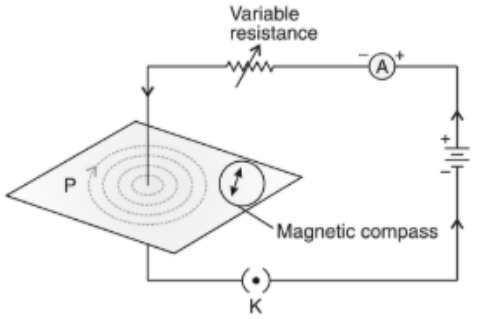
36. A solenoid is a long circular coil containing a large number of close turns of insulated copper wire. When a electric current is passed through the solenoid, it produces magnetic field around it as shown in fig. Magnetic field produced by a current carrying solenoid is similar to the magnetic field produced by a bar magnet. As is clear from the figure, the lines enter from the left side and leave out from the right side. If we look from left side, the current appears to be passing in the coil in clockwise direction and hence it acts as a south pole according to clock rule. If the coil is viewed from right side, the current appears to be in anticlockwise direction. Hence, left-hand side face behaves as if this were a north pole. If the coil is left free, it will point South and North.
Since the current in the turns of the solenoid flows in the same direction, the magnetic field produced by each turn of the solenoid adds up, giving a very strong resultant field inside the solenoid. Hence, a solenoid may be used in making electromagnets.



Strength of the magnetic field produced depends upon the following three factors :
Number of turns: Large the number of turns, stronger will be the magnetic field produced.
Strength of the current in the solenoid: Larger the current, stronger will be the magnetic field produced.
Nature of core of solenoid: The strength of the field depends upon the core on which the coil is wound. For air core, field is very mild whereas for iron-core, the field is very strong.

OR

a. The magnetic field lines produced around a current-carrying straight conductor passing through cardboard is shown below.



A right-hand thumb rule is applied to find the direction of these field lines. Imagine that you are holding a current-carrying straight conductor in your right hand such that the thumb points towards the direction of the current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field.

b. When we move away from the straight wire, the deflection of the needle decreases which implies the strength of the magnetic field decreases. The reason is that the concentric circles representing the magnetic field around a current-carrying straight wire become larger and longer as the distance increases.