Solution

Class 10 - Science

2020-2021 - Paper-5

Section A

1. The breaking and making of bonds in chemical reaction is called as Chemical Bonding.

   OR

   $2KClO_3$ (s) → $2KCl$(s) + $3O_2$ (g)

2. $2Na + 2C_2H_5OH \longrightarrow 2C_2H_5ONa + H_2$

   This reaction is known as the displacement reaction in which sodium removes hydrogen from ethanol to produce sodium ethoxide.

3. **(c)** ketone

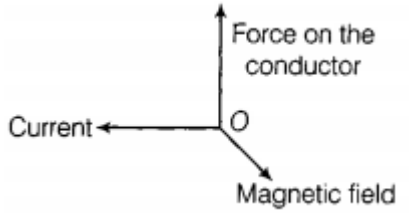
   Explanation: The functional group of butanone is ketone.

4. A lens is a piece of transparent medium bounded by two spherical surfaces.
5. The negative sign of the power of lens indicates that the focal length of the lens used for correction is negative. A concave lens is used for the correction of myopia and hence, the person is suffering from myopia.
6. Baking soda ($NaHCO_3$) does not contain water of crystallization

   OR

   Wash the hand immediately with plenty of water and then apply a paste of a mild base like baking soda ($NaHCO_3$) to neutralize the acid left. Strong bases like NaOH should be avoided as they damage the skin due to their corrosive nature.

7. Voltmeter is always connected in parallel to the ends of the resistor across which the potential difference is required to be measured.
8. The direction of magnetic field is perpendicular to both current and force on the conductor. (according to Fleming's left-hand rule).



9. Given energy =2 Kwh, power=100 W

   We also know that:

   Time, t = $\frac{\text{Energy}}{\text{Power}} = \frac{2\text{kWh}}{100\text{W}}$

   $= \frac{2000\text{Wh}}{100\text{W}}$ = 20h

   So time taken by the bulb to consume 2kwh energy =20 hours.

   OR

   Electrons are flowing from higher potential end to lower potential end through the conductor.

10. Peristalsis mainly causes the movement of food inside the alimentary canal.
11. Starch test experiment demonstrate the importance of light for photosynthesis.

    OR

    Blood doesn't clot in the blood vessels because of a chemical called heparin.

    Explanation:

    Heparin is an anticoagulant which does not allow the blood to clot in the blood vessels.

12. Sunlight is used during photosynthesis.

    OR

    A nutritive interaction among biotic communities (Organisms) involving a producer, various levels of consumers and a decomposer forms a food chain. Each step in a food chain is called a trophic level. There are three kinds of food chains: predator, parasitic and saprophytic chains.

13. Leaves show following adaptations for photosynthesis:

    (a) Flat surface to allow greater exposure to sunlight

(b) Presence of chlorophyll to trap solar energy
(c) Larger number of stomata on lower surface

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)** Both A and R are true but R is not the correct explanation of of the assertion
Explanation: Both A and R are true but R is not the correct explanation of of the assertion

OR

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

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) Right auricle → Right ventricle → Lungs → Left auricle → Left ventricle

ii.

	carries blood to body	carries blood to lungs	carries blood from lungs	carries blood from body
(d)	3	1	4	2

iii. (a) Aorta
iv. (b) Haemoglobin
v. (a) Left auricle and left ventricle

18. i. (b) H_2, Cl_2 and NaOH
ii. (b) Tartaric acid
iii. (c) basic salt
iv. (a) Washing soda
v. (b) cathode

19. i. (a) $V = \frac{W}{Q}$
ii. (d) double
iii. (d) 1 V
iv. (c) voltage
v. (a) Alessandra volta

20. i. (d) stong electrostatic force
ii. (b) transfer of electron
iii. (d) both (a) and (b)
iv. (b) 18
v. (b) Electrical conductivity in solid state

Section B

21. Some waste materials eliminated from our body are:
i. Nitrogenous waste like urea, uric acid etc.
ii. Excess of water.
Waste are generated by various metabolic activities like digestion, respiration etc.

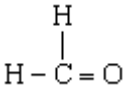
OR

The functions of food are as follows :
(a) It provides materials for the growth of the body.
(b) It helps to make new materials necessary for reproduction.
(c) It helps to regulate the body processes to maintain life.
(d) It helps in removal of waste materials from the body.
(e) It helps in repairing damaged cells and tissues.
(f) It helps in maintaining body temperature.

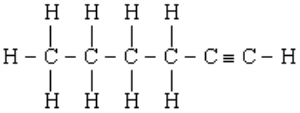
22. In order to transport the nutritive materials, waste materials, oxygen, carbon dioxide to the respective parts of the body, an extracellular fluid, blood circulates in our body. This process is called circulation.

23. i. CH_3-CH_2 -Br : Bromoethane

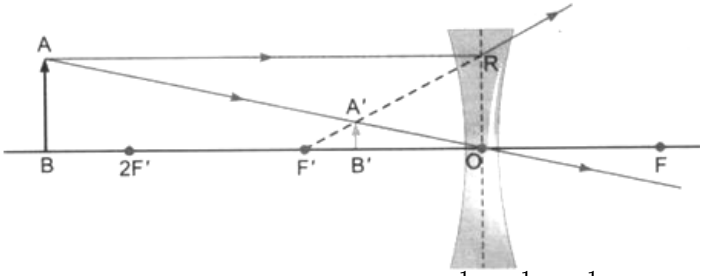
ii. Methanal:



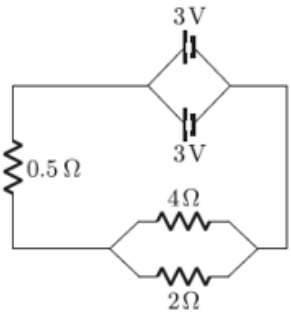
iii. Hex-1-yne:



24. All substances that are basic in nature turn phenolphthalein indicator pink. Thus, solution '**A**' is **basic** in nature as it turns phenolphthalein pink.
Solution '**B**' is an **acid** as it has made the solution colourless by neutralizing its basic nature. As soon as the solution becomes acidic while adding solution 'B' drop by drop, the colour of phenolphthalein changes from pink to colourless.
25. Since the lens is concave, hence f is negative
Given: u = - 30 cm; f= - 10 cm; h = 2.5 cm; v = ?; h' = ?



The lens formula for concave lens is $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
$\frac{1}{v} - \frac{1}{-30} = \frac{1}{-10}$
$\frac{1}{v} = \frac{1}{10} - \frac{1}{30}$
$\frac{1}{v} = \frac{-3-1}{30}$
v = -7.5 cm
The negative sign indicates the virtual nature of the image.
The image is at a distance of 7.5 cm from lens (in front of lens).
The magnification m = $\frac{v}{u} = \frac{-7.5}{30}$
= $\frac{1}{4}$
= +0.25
The positive sign with the magnification indicates that the image formed erect.
The size of the image is determined by h'.
$\frac{h'}{h}$ = m
h' = $h \times m$
= 2.5×0.25
= 0.625 m
Thus the image formed is virtual and erect. It is at a distance of 7.5 cm from lens and its size is 0.625 cm.
26. The circuit diagram is as follows:



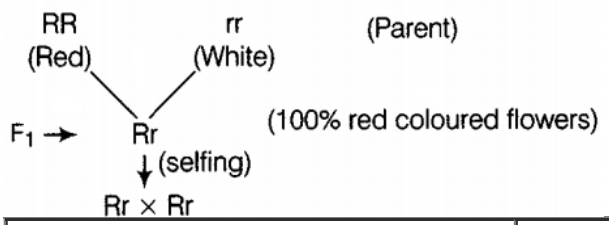
To calculate the current
Resistor 4Ω and 2Ω are connected in parallel. So, their equivalent resistance is given by
$R_p = \frac{4\times2}{4+2} = \frac{8}{6} = \frac{4}{3}\Omega = 1.33\Omega$

Total resistance of circuit,
R = R_p + $0.5\ \Omega$ = (1.33 + 0.5) Ω = 1.83 Ω
Current in the circuit,
$I = \frac{3V}{1.83\Omega} = 1.64\text{A}$
Potential difference across 0.5Ω resistor is
$V' = 1.64 \times 0.5$ = 0.82 V
The potential difference across 4Ω resistor is
V" = V - V' = 3 - 0.82 = 2.18 V
Thus, current flowing through 4Ω resistor is
$I_1 = \frac{2.18\text{V}}{4\Omega} = 0.55\text{A}$

27. Mendel's work remained unnoticed for about three decades, but after its rediscovery, the laws are being used for the various branches of breeding. These are used for improving the varieties of fowls and their eggs, in obtaining rust resistance and disease resistant varieties of grains. Various new breeds of horses and dogs are obtained by cross breeding experiments. The science of eugenics is the result of Mendelism.

OR

When two plants, A with white flowers and B with red flowers were crossed,
In F_1 generation all the plants have red coloured flowers and in F_2 generation the ratio of red : white is 3 : 1.
The dominant trait is red colour in flowers.
The recessive trait is white colour in flowers.

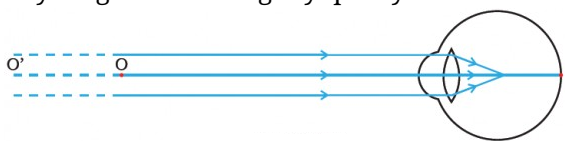


Gametes	**R**	**r**
R	RR(red)	Rr(red)
r	Rr(red)	rr(red)

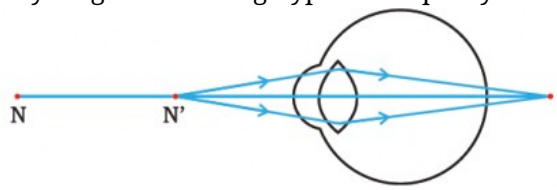
28. Ozone layer acts as a protective shield against the harmful Ultraviolet rays of the sun. Depletion of ozone layer leads to exposure to Ultraviolet rays & due to this the incidences of cancer, cataract are on rise. Also the uv rays damage the immune system of human beings.
In 1987, United Nations Environment Programme (UNEP) succeeded in forging an agreement between nations to freeze chlorofluorocarbons (CFCs) production to 1986 levels. CFCs are the main cause of ozone layer depletion.
29. Functions of lymph are as follows:
a) It returns tissue fluid from interstitial space into the blood.
b) It carries carbon dioxide, waste products and metabolites that diffuse into the blood through the tissue fluid.
c) Lymph carries lymphocytes (WBC'S) which provide immunity to the body and fight against the invading foreign organisms.
30. For the sustenance of life we require energy. We obtain this energy from our food. In the process of digestion, food molecules get converted into simpler substances such as, glucose. Then glucose combine with oxygen and provide energy to our body. The whole process is known as respiration. As because, energy is released during the process of respiration, so it is considered an exothermic reaction. For example,
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + energy
31. i. The elements which are soft and reactive metal are sodium (Na) and potassium(K) both of which are alkali metals and are very reactive, they can be cut easily with knife, thus they are very soft.
ii. Limestone is calcium carbonate $CaCO_3$. The important constituent of limestone is calcium (Ca), which is an alkaline earth metal.
iii. Metal which exists in liquid state at room temperature is mercury (Hg).
So, the increasing order of their reactivity is:

mercury < calcium < sodium
or, Hg < Ca < Na

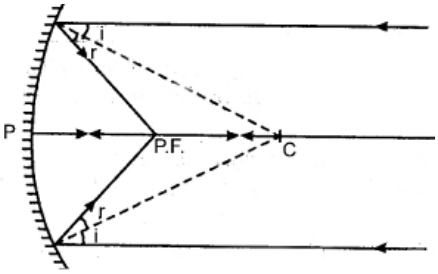
32. i. Neon (Ne)and argon (Ar) contain completely filled valence shells, hence their valency is zero. Both are monoatomic gases.
    ii. These elements do not possess any tendency to lose or gain electrons due to fully filled outer most shells. Thus, both are non-reactive monoatmic gases.
33. i. Ray diagram showing Myopic eye is:



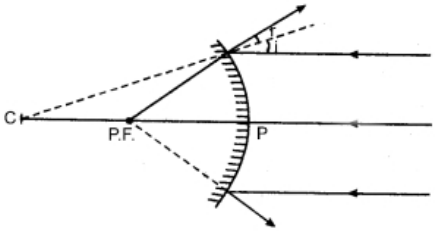
ii. Ray diagram showing hypermetropic eye is:



34. Light rays that are parallel to the principal axis of a concave mirror converge at a specific point on its principal axis after reflecting from the mirror. This point is known as the principal focus of the concave mirror.
Principal focus (p.f.) is a point on principal axis of a concave mirror where the rays parallel to principal axis meet after reflection from the mirror.

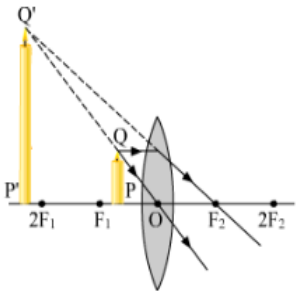


Additional reading. For convex mirror, principal focus is a point on principal axis of a convex mirror where rays parallel to principal axis appear to diverge from after reflection from the mirror.



OR

i.



ii. U is -ve,V is -ve. By lens formula:

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

$\Rightarrow \quad \frac{-1}{v} - \left(-\frac{1}{u}\right) = \frac{1}{f} \Rightarrow \frac{-1}{v} + \frac{1}{u} = \frac{1}{f}$

$\Rightarrow \quad \frac{-u+v}{uv} = \frac{1}{f} \quad \Rightarrow \quad f = \frac{uv}{v-u}$

This is a required relation between u, v and f in the case when object is placed between optical centre and principal focus of convex lens

iii. Given, m =-1
u = -20 cm
$\therefore$ m= $\frac{v}{u} \Rightarrow -1 = \frac{v}{-20}$
$\Rightarrow$ v = 20 cm
By lens formula, $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
$\Rightarrow \frac{1}{20} - \left(\frac{-1}{20}\right) = \frac{1}{f} \Rightarrow \frac{1}{20} + \frac{1}{20} = \frac{1}{f}$
$\Rightarrow \frac{1}{10} = \frac{1}{f} \Rightarrow f = 10\ cm$
$\therefore Power,\ p = \frac{1}{f} = \frac{1}{10 \times 10^{-2}} = 10D$
$\Rightarrow$ P = 10 D

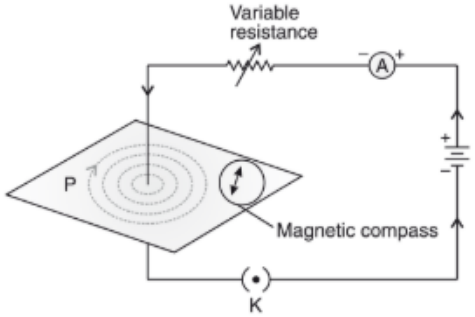
35. i. The ovary contains ovules and each ovule has an egg cell.
ii. Stamen produces pollen grains that are yellowish in the colour.
iii. The unisexual flower contains either stamens or carpels whereas the bisexual flower contains both stamens and carpels.
iv. When a pollen grain falls on the stigma of the carpel, it bursts open and grows into a pollen tube downwards through the style towards the female gamete in the ovary.
v. The tip of the pollen tube bursts open and the male gamete comes out of the pollen tube that combines with the nucleus of the female gamete present in the ovule to form a fertilized egg called a zygote.

36. i. Graph A represent D.C. and graph B represent A.C.
ii. Source of (A) - Dry cell
Source of (B) - A.C. generator
iii. For graph (B)
f $= \frac{I}{T} = \frac{1}{0.02}$
f $= 50\text{Hz}$
iv.

Its magnitude is constant and flows in one direction only.	Its magnitude and direction reserves periodically.
The frequency of D. C. is zero.	The frequency of A. C. is non-zero.

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.