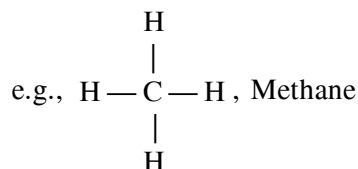
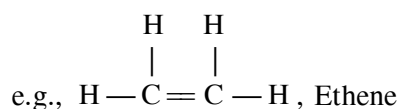


SECTION-A

1. Alkanes are saturated hydrocarbons and contains single bonds only



Alkenes are unsaturated hydrocarbons having double bonds.



2. (i) ${}_6\text{C}$, ${}_8\text{O}$, ${}_{10}\text{Ne}$ are in same period, i.e. 2nd period as they have two shells. ${}_{11}\text{Na}$ and ${}_{14}\text{Si}$ are in same period, i.e. 3rd period as they have three shells.
(ii) ${}_6\text{C}$, ${}_{14}\text{Si}$ are in same group because they have same number of valence electrons, i.e. four.
3. (a) Blob like structure at the tip of hyphae is sporangia.
(b) At the tip of the hyphae, tiny blob-like structures develop called sporangia which contain spores. These spores can develop into new Rhizopus individuals. The spores are covered by thick walls that protect them until they come into contact with another moist bread and can begin to grow.
4. (a) (i) Brown (ii) Blue (iii) Brown
(b) Eye colour in humans is an inherited trait. These are traits that are present in the gene or DNA of an organism and are passed on to their progeny.
5. (a) All were round yellow
(b) Round yellow-9
Round yellow-3
Wrinkled yellow-3
Wrinkled yellow-1

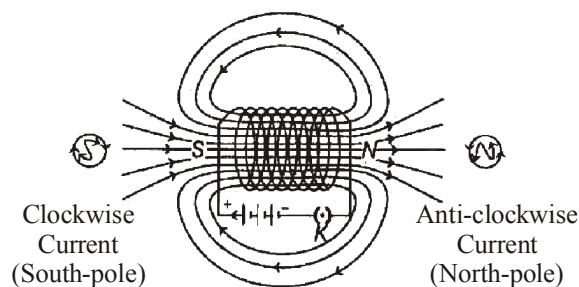
Hence, the ratio of offsprings in F_2 -generation was 9 : 3 : 3 : 1.

OR

When Mendel crossed pure tall pea plant (TT) with pure dwarf pea plant (tt), he obtained all hybrid tall pea plants (Tt), in F_1 -generation.

In F_2 -generation, he got 3 : 1 phenotypic ratio of plant with 3 out of 4 being tall and 1 dwarf.

6. Magnetic lines of force due to a current carrying solenoid are shown in figure below.



Magnetic pole formation at the ends of solenoid can be explained by looking at one face of the solenoid coil. If the direction of current through the coil is seen clockwise by looking at a face of solenoid coil, then that face has South polarity and if the direction of current is anti-clockwise, then that face has North polarity.

OR

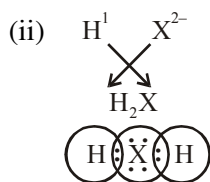
- (a) Alpha particles being positively charged, constitutes a current in the direction of their motion. Hence, an α -beam produces a magnetic field.
- (b) Neutron being electrically neutral constitute no current. So, a neutron beam cannot produce a magnetic field.
7. According to 10% law only 10% of energy is available at the next trophic level. For example- If energy available at producer level is 1000J then at next level only 10% of 1000J i.e. 100J is available Plant-deer-lion Plant will have 1000J, deer 100J and lion 10J.

OR

- (a) The flow of energy is unidirectional because the energy lost as heat to the environment can't be reutilized by plants for photosynthesis. Energy decrease at each trophic level (10% of previous level). Hence it can't be reused again.
- (b) Significance of food chain-
- (i) It is a means of transfer of food from one trophic level to another.
- (ii) It provides information about the living components of our ecosystem

SECTION-B

8. (i) C_2H_6 and C_3H_8 are molecular formula of 2nd and 3rd member of alkanes.
- (ii) C_nH_{2n} , Ethene
- (iii) Methanol (CH_3OH) and Ethanol (CH_3CH_2OH).
9. (i) 'X' has electronic configuration 2, 8, 6
- \therefore It has 6 valence electrons, therefore, its valency equal to 2.



(iii) 'X' is Sulphur. It is non-metallic.

OR

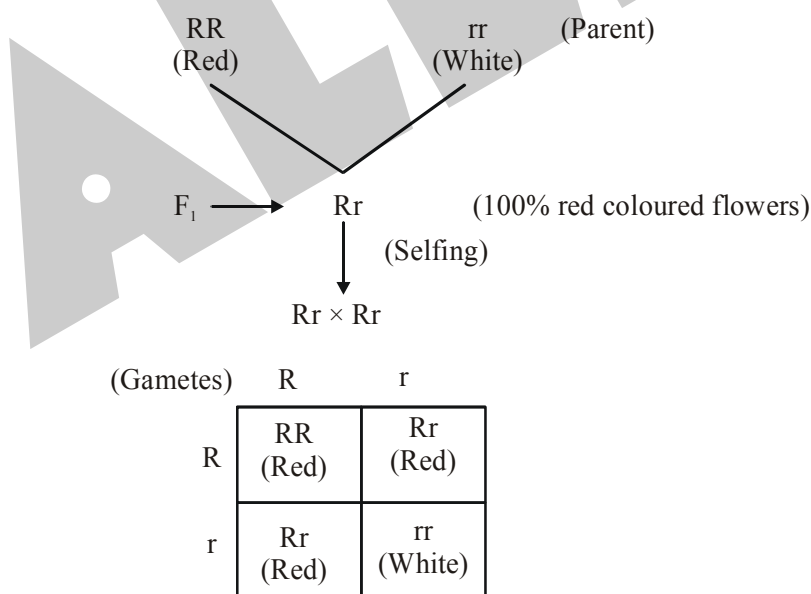
(a) (i) **Valency** : Valency of an element is the measure of its combining power or the combining capacity of an atom with other atoms when it forms chemical compounds or molecules.

(ii) **Atomic size** : Atomic size or atomic radius is the distance between the centre of the nucleus and the outermost shell of an isolated atom.

(b) **Variation in valency** : On moving from left to right in the periodic table, valency increases up to 4 and then decreases.

Variation in atomic size: Atomic size decreases along a period. This is because on moving across a period, the number of valence shells remains the same and the electrons increase by one unit. As a result, the effective nuclear charge increases and thus, the atomic radius decreases.

10. In F_1 , all the plants have red coloured flowers and in F_2 the ratio of red : white is that of 3 : 1. The dominant trait is red colour of flowers. The recessive trait is white colour of flowers.



F_2 - generation 3 : 1

11. Resistance of Nichrome wire, $R = 10 \Omega$

Where, $R = \rho \times \frac{\ell}{A}$ and $A = \pi r^2$

(i) When only length of wire is doubled ($\ell' = 2\ell$),

$$\therefore R \propto \ell$$

$$\therefore \frac{R'}{R} = \frac{\ell'}{\ell} \Rightarrow R' = R \frac{\ell'}{\ell} = 10 \times \frac{2\ell}{\ell}$$

$$\Rightarrow R' = 20 \Omega$$

(ii) When only diameter of wire is doubled [$r' = 2r$, since Radius (r) = $\frac{\text{Diameter (d)}}{2}$]

$$R \propto \frac{1}{A} \propto \frac{1}{r^2} \quad [\because A = \pi r^2]$$

$$\text{So, } \frac{R'}{R} = \frac{r^2}{(r')^2}$$

$$\therefore d' = 2d \therefore r' = 2r$$

$$\text{Therefore, } R' = R \times \left[\frac{r}{r'} \right]^2 = 10 \times \left[\frac{r}{2r} \right]^2 = \frac{10}{4}$$

$$\Rightarrow R' = 2.5 \Omega$$

12. (i) **Principle of working of an electric motor :**

It is based on the fact that when a current-carrying coil is placed in an external magnetic field, it experiences equal and opposite forces on its edges which rotates it continuously.

(ii) **Function of parts of electric motor :**

(a) **Armature :** To transmit electric current across the magnetic field since it carry electric current flow. It is used to experience a magnetic force on it to rotate itself when it is placed in a magnetic field with carrying current through it. Thus electrical energy is converted into mechanical energy in an electric motor.

(b) **Brushes :** They maintain the electric contact between armature coil and main supply circuit for proper current flow.

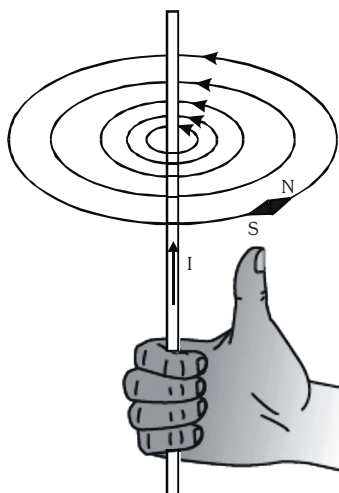
(iii) Electric Fan, Washing Machine.

OR

(i) Magnetic field lines can never intersect each other because if they intersect at a point, magnetic field at that point will have two directions which is not possible. (If we put a magnetic needle at such a point, it should point in two directions, that is impossible.)

(ii) **Right hand thumb rule :**

'Imagine that you are holding a current-carrying straight conductor in your right hand and the thumb is stretched along the direction of current, then, your fingers will wrap around the conductor in the direction of the field lines of the magnetic field'.



- (iii) Magnetic field (at a point/place) produced by a straight current carrying conductor depends upon
- Current : It is directly proportional to the current flowing through the conductor.
 - Distance from conductor : It is inversely proportional to the distance of the conductor from that point/place.

13. (a) The primary consumers are the organisms who directly feed on the producers.
In the given food web, rabbits and mice are the primary consumers.
- (b) The foxes feed on the rabbits and mice. If all the foxes are killed then there will be no direct predator of rabbits and mice, hence the number of rabbits and mice will increase in the given ecosystem, which will disturb its balance.

SECTION-C

14. (a) It is IUCD – Intrauterine device or copper 'T'
(b) It is most commonly made up of copper
(c) Copper T suppresses fertilising capacity of sperm so it prevents fertilization and implantation.

OR

Intra-uterine device are highly effective in preventing unwanted pregnancies. But they come with one disadvantage, that is they can get expelled anytime without the knowledge of women.

15. (a) As per the circuit shown in question figure, the potential difference across $15\ \Omega$ resistor, $V_2 = 9 - 6 = 3\ \text{V}$
so, the current flowing through $15\ \Omega$ resistor,

$$I = \frac{V_2}{15} = \frac{3}{15} = 0.2\ \text{A}$$

Since resistors 'R' and ' $15\ \Omega$ ' both are connected in series; same current flows through 'R'. Therefore,

$$\text{resistance of unknown resistor 'R'} = \frac{V_1}{I} = \frac{6}{0.2} = 30\ \Omega$$

- (b) If both $15\ \Omega$ and $30\ \Omega$ resistors are connected in parallel to same battery, then

$$R_{\text{eq}} = \frac{15 \times 30}{15 + 30} = \frac{450}{45} = 10\ \Omega$$

Current supplied by the battery,

$$I = \frac{V}{R_{eq}} = \frac{9}{10} = 0.9 \text{ A}$$

- (c) In series combination of 30Ω and 15Ω resistors, power consumed by each resistor will be as follows :

$$P_{15} = I^2 R_{15} = (0.2)^2 \times 15 = 6 \text{ Watt}$$

and

$$P_{30} = I^2 R_{30} = (0.2)^2 \times 30 = 12 \text{ Watt}$$

OR

In parallel combination of 30Ω and 15Ω resistors, heat dissipation by each resistor in 20 seconds will be as follows :

$$H_{15} = \left(\frac{V^2}{R_{15}} \right) \times t = \frac{9^2}{15} \times 20 = 108 \text{ J}$$

and
$$H_{30} = \left(\frac{V^2}{R_{30}} \right) \times t = \frac{9^2}{30} \times 20 = 54 \text{ J}$$