
CBSE Sample Paper-03
SUMMATIVE ASSESSMENT –II
SCIENCE (Theory)
Class – X

Time allowed: 3 hours

Maximum Marks: 90

General Instructions:

- a) All questions are compulsory.
- b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
- c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
- d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
- e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
- f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
- g) Questions 25 to 27 in section B are 2 marks questions and Questions 28 to 36 are multiple choice questions based on practical skills. Each question of multiple choice questions is a one mark question. You are to select one most appropriate response out of the four provided to you.

Section A

- 1. What is the focal length of a lens, whose power is given as +2.0 D?
 - 2. In a food chain comprising lion, grass and deer, which will:
 - (a) transfer the maximum amount of energy?
 - (b) receive minimum amount of energy?
 - 3. What is denaturated alcohol?
 - 4. What are fossils? Of what interest are fossils to the evolutionary biologists?
 - 5. With respect to air, the refractive index of ice is 1.31 and that of rock salt is 1.54. Calculate the refractive index of rock salt with respect to ice.
 - 6. Why is K more reactive than Li?
 - 7. What do you understand by periodicity? Are the properties of elements placed in a group same? Illustrate.
 - 8. What was Dobereiner's basis of classification of elements?
 - 9. Explain double fertilization in plants.
 - 10. What is vegetative propagation? When is it used? Name three methods of vegetative propagation.
 - 11. Define the term "Heridity". In which type of organisms in heredity supposed to be better defined – in sexually reproducing or asexually reproducing kind? Why?
 - 12. Explain with an example. How evolutionary relationship linked to classification?
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13. The radius of curvature of a convex mirror used on a moving automobile is 2.0 m. A truck is coming behind it at a constant distance of 3.5 m. Calculate (i) the position and (ii) the size of image relative to the size of truck. What will be the nature of image?
14. Define (i) regular reflection and (ii) diffused reflection. List the differences between them.
15. Ramesh and his friends performed well in SA-1. They wanted to go for outing, so they made a request to the principal in this regard. It was decided that they will go by cycle to witness the famous Ranapur water fountain show, situated nearly eight kilometers from their place, with their physical education teacher.
- It was sunny day. They all enjoyed, rejuvenated and rejoiced mind and body. Ramesh was thrilled as he saw an exciting natural spectrum appearing in the sky when he looked at the sky through the water fountain, with the sun behind him. He came back with a number of questions in his mind.
- Read the given passage and answer the following questions:
- (a) Name the natural spectrum appearing in the sky. How does it form?
- (b) Draw a ray diagram showing formation of natural spectrum appearing in the sky.
- (c) What value of shown by Ramesh
16. How do we see colours? Explain the role of cells to respond (i) intensity, (ii) colour. What is colour blindness?
17. What is ten percent law? Explain with an example how energy flows through different trophic levels?
18. Replenishment of forests is essential. Justify the statement by giving any three reasons.
19. Explain the cleansing action of soaps and detergents.

Or

Write in short, how carbon compounds are named according to IUPAC nomenclature?

20. Explain double bond and triple bond with help of two examples in each case.

Or

Explain the following terms:

- (a) Emulsifying (b) Substitution reaction (c) Polymerization
(d) Saponification (e) Methylated spirit

21. Tabulate the process of reproduction into its various types, giving one example of each type.

Or

Define grafting. Suggest any two advantages and disadvantages of grafting.

22. Describe the anatomy of human male reproductive system.

Or

What is meant by tissue culture? How this technique is performed? In which area this technique is finding its application?

23. (i) State the lens's formula and its magnification.
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- (ii) Using the lens formula, locate the position of an image formed due to an object at infinity by a convex lens of focal length f .

Or

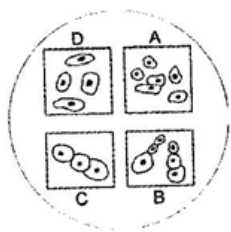
- (i) How will you find the net focal length of a combination of lenses whose focal length are 15 cm and -5 cm respectively?
- (ii) Define power. Find the power of the combination and express whether it is converging or diverging combination.
24. Draw a labelled diagram of human eye and explain the image formation.

Or

What is cause for (i) Myopia and (ii) Hypermetropia
Show the defective eye and explain how it is corrected?

Section B

25. (i) When acetic acid reacts with ethyl alcohol, we add conc. H_2SO_4 . It acts as _____ and the process is called _____.
- (ii) Write the chemical equation for the same.
26. (i) A student observed a slide of yeast under a microscope and saw collection of cells in different parts of the slide marked A, B, C and D as shown below:



- (ii) Justify your answer.
27. (a) Given below are few steps (not in proper sequence) followed in the determination of focal length of a given convex lens by obtaining a sharp image of a distant object:
- (i) Measure the distance between the lens and screen.
 - (ii) Adjust the position of the lens to form a sharp image.
 - (iii) Select a suitable distant object.
 - (iv) Hold the lens between the object and the screen with its faces parallel to the screen.
- Write the correct sequences of steps for determination of focal length.
- (a) Justify your answer.
28. A student is asked to add a tea spoon full of solid sodium bicarbonate to a test tube containing approximately 3 mL of acetic acid. He observed that the solid sodium bicarbonate:
- (a) floats on the surface of acetic acid.
 - (b) remains suspended in the acetic acid.
 - (c) settles down in the test tube.
 - (d) reacts with acetic acid and a clear solution is obtained.
29. Sodium bicarbonate solution is added to dilute ethanoic acid. It is observed that:
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- (a) a gas evolves.
(b) a solid settles at the bottom.
(c) the mixture becomes warm.
(d) The colour of the mixture becomes light yellow.
30. Regeneration observed in:
(a) Starfish (b) Earthworm (c) Hydra (d) All of these
31. Fission of two types of gamete known as:
(a) Fertilization (b) Zygote (c) Binary fission (d) Cytokinesis
32. In binary fission:
(a) The identity of the parent body is maintained after reproduction.
(b) The parent body is lost after reproduction.
(c) The parent body enlarges.
(d) None of these
33. A yeast cell in which budding occurs, it can have:
(a) One bud cell (b) Two bud cells
(c) Three bud cells (d) A chain of bud cells
34. The point at the centre of a lens is called as:
(a) Pole (b) Optical centre (c) Focus (d) Aperture
35. A lens of focal length f is cut into two equal parts without affecting its curvature. The two pieces will have equal focal length of:
(a) f (b) $2f$ (c) $\frac{f}{2}$ (d) $\frac{f}{3}$
36. Vinita took 20 grams of seeds and placed them in distilled water in a petridish. She weighted the seeds kept in water at regular interval of two hours. She performed this activity four times continuous. In which interval of time she found more water had been imbibed by them:
(a) Two hours (b) Four hours (c) Six hours (d) Eight hours
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CBSE Sample Paper-03
SUMMATIVE ASSESSMENT –II
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(Solutions)

SECTION-A

1. $f = \frac{1}{P} = \frac{1}{+2.0} = +50 \text{ cm}$
2. (a) Grass, (b) Lion
3. Denaturated alcohol is Ethanol mixed with poisonous substance like CuSO_4 or pyridine or methanol.
4. A fossil is the remnant or impressions of an organism that lives in the remote past e.g. Archaeopteryx.

Use of fossils:

- (i) The fossil record has helped in building the broad historical sequence of biological evolution.
- (ii) Phylogeny, the evolutionary history can be reconstructed from fossils.
- (iii) The habits, habitats and behaviour of extinct organisms can be inferred from well preserved fossils.

5. $_{\text{air}}\mu_{\text{ice}} = 1.31, \quad _{\text{air}}\mu_{\text{rock}} = 1.54$
 $_{\text{ice}}\mu_{\text{rock}} = \frac{_{\text{air}}\mu_{\text{rock}}}{_{\text{air}}\mu_{\text{ice}}} = \frac{1.54}{1.31} = 1.18$

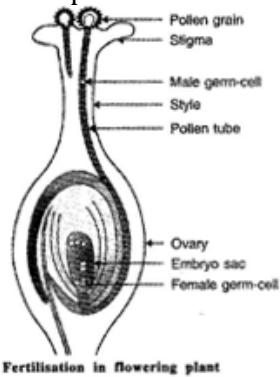
6. K is larger in atomic size, therefore, it can lose electrons easily due to less force of attraction between valence electrons and nucleus than Li.
7. The repetition of similar properties after a definite interval of time is called periodicity of property. Yes the properties of elements placed in a group are similar e.g.
 - (i) Group I elements form monovalent ions. $\text{Li}^+, \text{Na}^+, \text{K}^+$ etc.
 - (ii) Group I elements are soft metals.
 - (iii) Group I elements form basic oxides.
 - (iv) They are highly electropositive and most reactive.
8. Dobereiner classified elements in triads such that atomic mass of middle element was average of atomic mass of first and third element. e.g.

Li	Na	K
7	23	39

Average atomic mass of Li and K = $\frac{7+39}{2} = 23$ which is atomic mass of Na.

9. **Double Fertilization in plants.** Pollination is followed by fertilization in plants.
 - After the pollen lands on a suitable stigma, it has to reach the female germ cells in the ovary.
 - The pollen tube grows out of the pollen grain through the style to reach the ovary.
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- After fertilization the zygote divides several times to form an embryo within the ovule.
- The ovule then develops a tough coat and gets converted into a seed.
- The seeds contain the future embryo which develops into seedling.
- The ovary develops and ripens to form a fruit.
- The process of double fertilization occurs inside each embryo sac, in which two fusions, syngamy and triple fusion take place.
- When one male gamete fuses with the egg contained in the embryo sac of the ovule, this fusion of male and female gametes is called syngamy and its product is the zygote.
- The other male gamete fuses with the two polar nuclei and this process is called triple fusion, where three nuclei are involved in the fusion process, one male gamete and two polar nuclei.



10. The method of developing new plants from the vegetative parts of a plant, such as root, stem of leaf is called **Vegetative propagation**.

Vegetative propagation can be classified into natural and artificial methods.

- By natural method from
 - Leaves – e.g. Bryophyllum
 - Stems – e.g. Ginger
 - Roots – e.g. Guava
- By artificial method of-
 - Cutting of stem, root, leaf, bulb scale
 - Layering of stem
 - Grafting
 - Parthenogenesis

The method of vegetative propagation is used when some plants like banana, orange, rose and jasmine have lost the capacity to produce seeds.

The three methods of vegetative propagation which have developed by artificial methods of vegetative propagation are cutting, layering and grafting.

11. “Heredity” refers to the transmission of characters or traits from the parents to their offsprings.

Heredity is better defined as asexually reproducing kinds.

Heredity is better defined as asexually reproducing kinds, because asexual reproduction tends to preserve the similarities among all the individuals belonging to a given line of descent.

12. Evolutionary relationship is linked with classification in the following ways:

- The more common characteristics two species have, the more closely they are related.

- The more closer the species are, the more nearer they have a common ancestor.
- For example, a brother and a sister are closely related and they have a common ancestor, their parents in the first generation.
- A girl and her first cousin are closely related but less related than her brother. The cousins have a common ancestor, their grandparents in the second generation. Thus, evolutionary relationships are traced in the classification of organisms.

13. For convex mirror, Given: $R = 2.0 \text{ m}$, $u = -3.5 \text{ m}$

$$(i) \quad \frac{1}{f} = \frac{1}{u} + \frac{1}{v} \quad \Rightarrow \quad \frac{2}{R} = \frac{1}{u} + \frac{1}{v} \quad \left[\because f = \frac{R}{2} \right]$$

$$\Rightarrow \frac{1}{v} = \frac{2}{R} - \frac{1}{u} = \frac{2}{2} - \frac{1}{(-3.5)} = 1 + \frac{10}{35} = \frac{9}{7}$$

$$\Rightarrow v = +\frac{7}{9} \text{ m}$$

Since v is positive so image is formed behind the mirror and it is virtual.

$$(ii) \quad \text{Magnification } (m) = \frac{h'}{h} = \frac{-v}{u} \quad \Rightarrow \quad h' = \frac{-v}{u} \times h = \frac{-\left(\frac{7}{9}\right)}{(-3.5)} \times h = \frac{2}{9} h < 1$$

$\therefore$ Size of image is $\frac{2}{9}$ times the size of object i.e. diminished in size.

14. (i) **Regular reflection:** When the beam of light falls on any polished or smooth surface, it gets reflected in only one direction. This phenomenon is known as regular reflection.
- (ii) **Diffused reflection:** When the light falls on any uneven surface, it gets scattered back in all the directions. This phenomenon is known as diffused reflection.

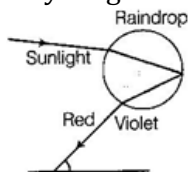
Difference between Regular and Diffused reflection:

Regular Reflection	Diffused Reflection
(a) $\angle i = \angle r$	(a) $\angle i \neq \angle r$
(b) Reflection takes place from smooth surface.	(b) Reflection takes place from uneven surface.
(c) Reflected rays are parallel to each other.	(c) Reflected rays are not parallel to each other.

15. (a) A rainbow is a natural spectrum appearing in the sky after a rain shower. A rainbow is always

formed in a direction opposite to that of the sun. The water droplets act like small prisms. They disperse the white light due to which rainbow forms.

- (b) A ray diagram for the formation of natural spectrum appearing in the sky:



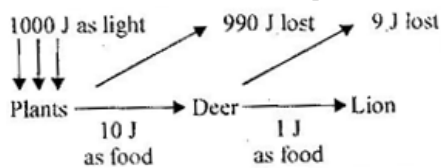
- (c) Value shown by Ramesh are faith in authority, discipline and friendship.

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16. Colours are seen associated with an object, if it reflects that colour when light falls on it.
- Intensity of light is responded by the rod-shaped cells on the retina.
 - Cones in the retina are special cells which respond and distinguish various colours.

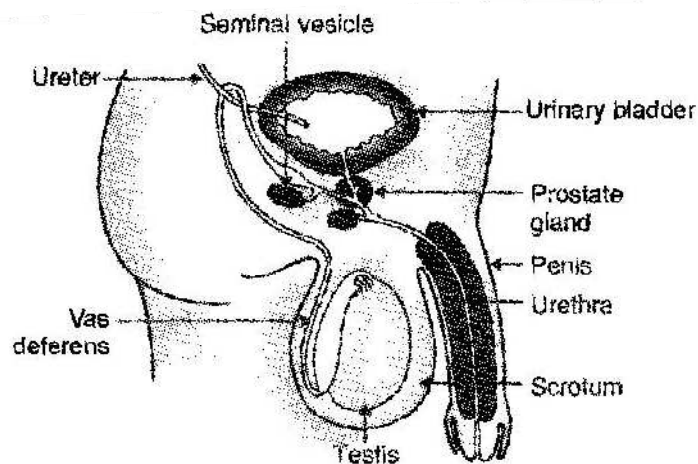
Role: The cells generate the electrical nerve pulse.

If the person has less or no cone cells, then he will not be able to distinguish between the colours. This is called colour blindness.

17. Energy available at each successive trophic level of food chain is 10 percent of the previous level. This is called 10 percent law. This is due to the fact that 90% energy is lost to the environment at each trophic level.



18. Replenishment of forests is essential because of the following reasons:
- Trees give out enormous amounts of water by the process of transpiration. This helps in the rain clouds.
 - Plants prevent the washing away of top soil which is rich in organic matter. It prevents soil erosion.
 - Forests provide raw materials for many industries and form a natural habitat for wildlife.
19. **Male reproductive system:** It consists of portions that produce the germ-cells and other portions that deliver the germ-cells to the site of fertilization. The human male reproductive system consists of the following organs:



Human Male Reproductive System

- Testes** (singular testis) are the oval-shaped primary reproductive organ in man. A pair of testis lies in a small sac-like muscular structure outside the abdominal cavity called scrotum. The function of testis is to produce sperm and male sex hormones called testosterone. The scrotum provides the optimal temperature for formation of sperms.
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- **Epididymis** is a coiled tube like structure firmly attached to the testis and serves as the storehouse of sperms. Inside the epididymis, sperms become mature and develop motility.
 - **Vas deferens.** The sperms are carried by a long tube called Vas deferens or sperm duct into organs called seminal vesicles, where the sperms get nourished and stored.
 - **Urethra** is a common duct for the passage of both urine and spermatogenic fluid. Urethra carries the sperms to an organ called penis which opens to the outside through a male genital pore.
 - **Penis** forms the external male genital organ. It is a copulatory organ which has thick muscular walls.
 - **Accessory Glands.** Seminal vesicles are a pair of thin-walled muscular elongated sacs which secrete fluid for nourishment of sperms.
 - **Prostate glands** also produce fluid which is released in the urethra along with secretion of seminal vesicle. The secretion of accessory glands together with sperms is called semen.
 - **Sperms** are tiny bodies that consist of mainly genetic material and a long tail which helps them to move towards the female germ cell.

Or

Tissue culture is the production or propagation of new plants from isolated plant cells or small pieces of plant tissue in a synthetic medium or culture solution. Tissue culture for producing new plants is done as follows:

- Plants are grown by removing tissues or separating cells from the growing tip of the plant and put in an artificial medium.
- The plant tissue divides to form small groups of cells or callus.
- The callus is transferred to another medium containing hormones for growth and differentiation that form plantlets.
- The plantlets produced are transplanted into pots or soil where they can grow to form a mature plant.
- This technique is also known as micro-propagation in vitro because it takes place outside the body of the parent plant in a test tube using an artificial environment.
- Micro-propagation technique is being used for the production of ornamental plants like Orchids, Dahlia and Carnation.

20. (i) Lens's formula : $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\text{Magnification } (m) = \frac{v}{u}$$

(ii) Since $u = -\infty$ and $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$,

$\therefore$ The image distance should be equal to focal length. The image is formed at the focus.

Or

(i) Net focal length of a combination of lenses can be found by using the relation,

$$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$$

If $f_1 = 15$ cm and $f_2 = -15$ cm, then

$$\frac{1}{f} = \frac{1}{15} - \frac{1}{15} = \frac{1-1}{15} = \frac{0}{15}$$

$$\therefore f = -7.5 \text{ cm}$$

- (ii) Power is defined as the ability to converge or diverge the light after refraction. It is the reciprocal of focal length, i.e. $P = \frac{1}{f}$ and is expressed in dioptres.

Power of the combination of two lenses is $P = P_1 + P_2$

Since $f_1 = 15$ cm and $f_2 = -15$ cm, then

$$P_1 = \frac{+100}{15} = 6.6 \text{ dioptre and } P_2 = \frac{-100}{15} = -6.6 \text{ dioptre}$$

Since $P_1 + P_2$ is the equivalent power is negative and so the combination behaves as a concave lens.

21.

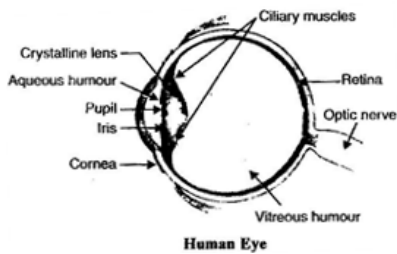
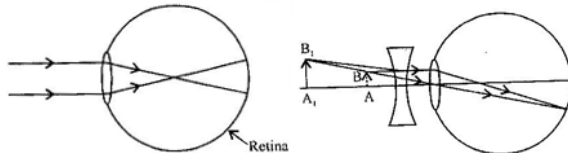


Image formation: Light enters through a thin membrane called cornea. The lens made up of cornea and aqueous humour do refract the light and forms image on the light-sensitive screen called retina. The iris, a dark muscular portion controls the size of the pupil. It becomes very small on very bright light and opens up on dim light. The retina has rods and cones as two cells. The rods responds to the intensity of light and the cones respond to the colour

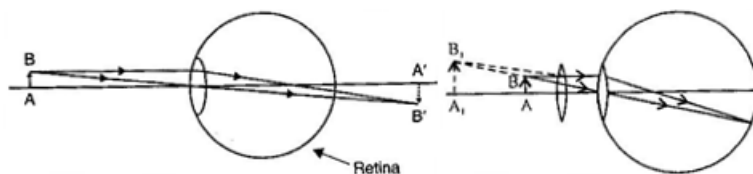
Or

- (i) Cause for Myopia: Excessive curvature of the cornea or the elongation of the eye-ball.



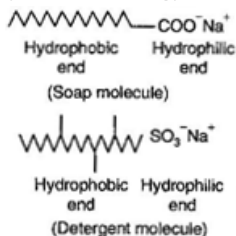
It is corrected by concave lens of suitable focal length.

- (ii) Cause for Hypermetropia: The focal length of the lens becomes too short and so nearby objects cannot be seen clearly. The eye-ball may become too short.

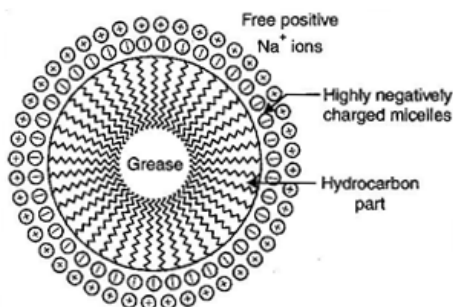


It is correct by the convex lens of suitable focal length.

22. Soaps and detergents consist of a large hydrogen chain as tail and a negatively charged functional group as head. The tail is hydrophobic (water repelling) and the head is hydrophilic (water loving).



In aqueous solution, water molecules being polar in nature, surround the ions (hydrophilic part) and not the hydrophobic part of the soap or detergent. In cleansing clothes, the hydrocarbon or hydrophobic part attaches itself to oily dirt, thus forming a cluster called **micelles**. When water is agitated, the oily dirt tends to lift off from the surface of the clothes and dissociate into fragments. This gives opportunity to other tails to stick to oily dirt. The solution now contains small globules of oily dirt surrounded by soap/detergent molecules. The negatively charged heads present in water prevent the small globules from coming together and form aggregates. This results in the removal of dirt when clothes are further washed with water.



Or

Naming of carbon compounds can be done by the following method:

- Identify the number of carbon atoms in the compounds. For example a compounds containing three carbon atoms would have the name propane, containing five carbon atoms would have the name pentane.
- In case, a functional group present, it is indicated in the name of the compound with either a prefix or a suffix as given in table below.
- If the name of the functional group is to be given as a suffix, the name of the chain is modified by deleting the final 'e' and adding the appropriate suffix. For example, a three carbon chain with a ketone group would be named in the following manner:

Propane – 'e' = Propan + 'one' = Propanone

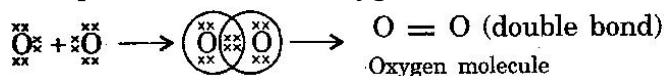
- (iv) If the carbon chain is unsaturated, then the final 'ane' in the name of the carbon chain is substituted by 'ene' or 'yne' as given in the table below. For example, a three carbon chain with a double bond would be called propene and if it has a triple bond, it would be called propyne.

Nomenclature of functional group

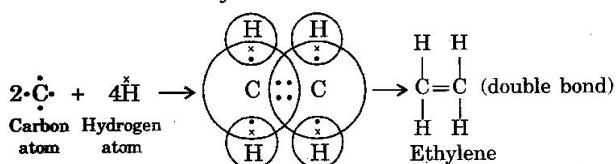
Function group	Prefix/Suffix	Examples
1. Halogen (Cl, Br, I)	Prefix-chloro, bromo, iodo, etc.	$\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ Chloropropane $\text{CH}_3\text{CH}_2\text{Br}$ Bromoethane
2. Alcohols ($-\text{OH}$)	Suffix-ol	$\text{CH}_3\text{CH}_2\text{CH}_2-\text{OH}$ Propanol
3. Aldehyde ($-\text{C} \begin{smallmatrix} \text{H} \\ \diagup \\ \text{O} \end{smallmatrix}$)	Suffix-al	$\text{CH}_3\text{CH}_2-\text{CHO}$ Propanal
4. Ketone ($-\text{C}(=\text{O})-$)	Suffix-one	$\text{CH}_3-\overset{\text{O}}{\underset{\text{ }}{\text{C}}}-\text{CH}_3$ Propanone
5. Carboxylic acid ($-\text{C}(=\text{O})-\text{OH}$)	Suffix-oic acid	$\text{CH}_3\text{CH}_2-\text{COOH}$ Propanoic acid
6. Double bond ($-\text{C}=\text{C}-$) (alkenes)	Suffix-ene	$\text{CH}_3\text{CH}=\text{CH}_2$ Propene
7. Triple bond ($-\text{C}\equiv\text{C}-$) (alkynes)	Suffix-yne	$\text{CH}_3-\text{C}\equiv\text{CH}$ Propyne

23. **Double bond:** The bond formed between two atoms by sharing of two pairs of electrons is called a double bond.

Examples: Formation of Oxygen molecule.

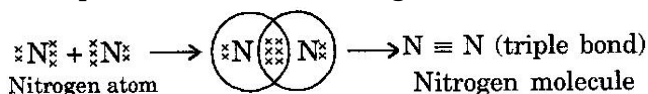


Formation of Ethylene molecule

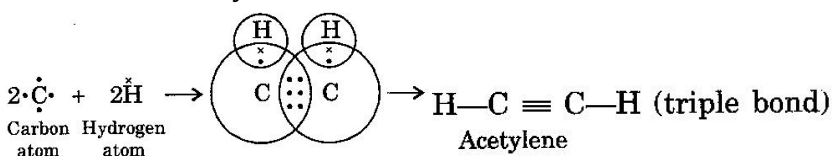


Triple bond: The bond formed between two atoms by sharing of three pairs of electrons is called a triple bond.

Examples: Formation of Nitrogen molecule.



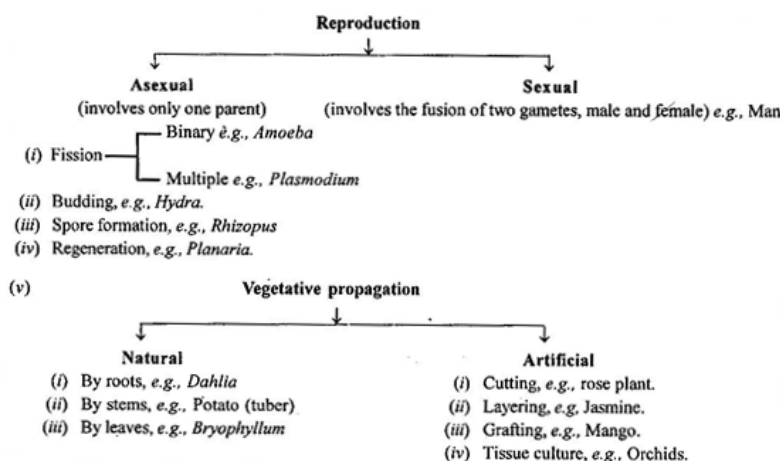
Formation of Acetylene molecule



Or

- (i) **Emulsifying action:** The action of soaps and detergents on dirt in clothes is called emulsifying action.
- (ii) **Substitution reaction:** Reactions in which an atom or group of atoms of a compound is replaced by other atom or group of atoms.
- (iii) **Polymerisation:** Process in which similar or different molecules combine together in the presence of catalyst to form long chain compounds.
- (iv) **Saponification:** Process in which an ester reacts with sodium hydroxide to form alcohol and sodium salt of acid.
- (v) **Methylated spirit:** Ethyl alcohol contaminated with methyl alcohol and other impurities.

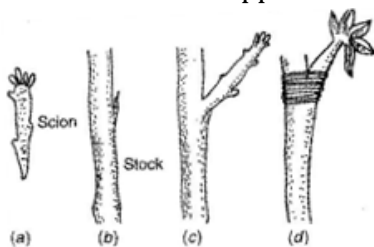
24.



Or

Grafting: In this method of reproduction, two plants of closely related varieties are joined together so that they live as one plant.

- The portion of a plant that is grafted on the other plant is called scion and the plant in which grafting is performed is called the stock.
- This method is applied to improve variety of fruits like mango, apple, peas, citrus and guava.



Different stages in Grafting

Advantages:

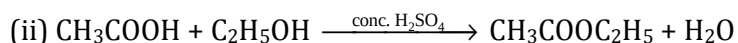
- (i) A young scion can be made to flower when it is grafted on a mature tree.
- (ii) Different varieties can be grafted on the same stock.

Disadvantages:

- (i) Sexual reproduction is a necessity for evolution.
- (ii) Plants produce very few seeds.

Section B

25. (i) dehydrating agent, esterification



26. (i) Slide A is showing the budding in yeast.

(ii) Because buds appear as protuberances.

27. (a) The correct sequence is: (iii), (iv), (ii), (i)

(b) Unless an object is chosen and setting of lens and screen in proper, image distance and thereby the focal length cannot be found.

28. (d)

29. (a)

30. (d)

31. (b)

32. (b)

33. (d)

34. (b)

35. (a)

36. (d)
