

SAI VIDHYA NIKETHAN MATRIC. HR. SEC. SCHOOL MATHAMPALAYAM, COIMBATORE - 19

STD : 10

SCIENCE
PART - I

75 M

I. Choose the most suitable answer

12 x = 12

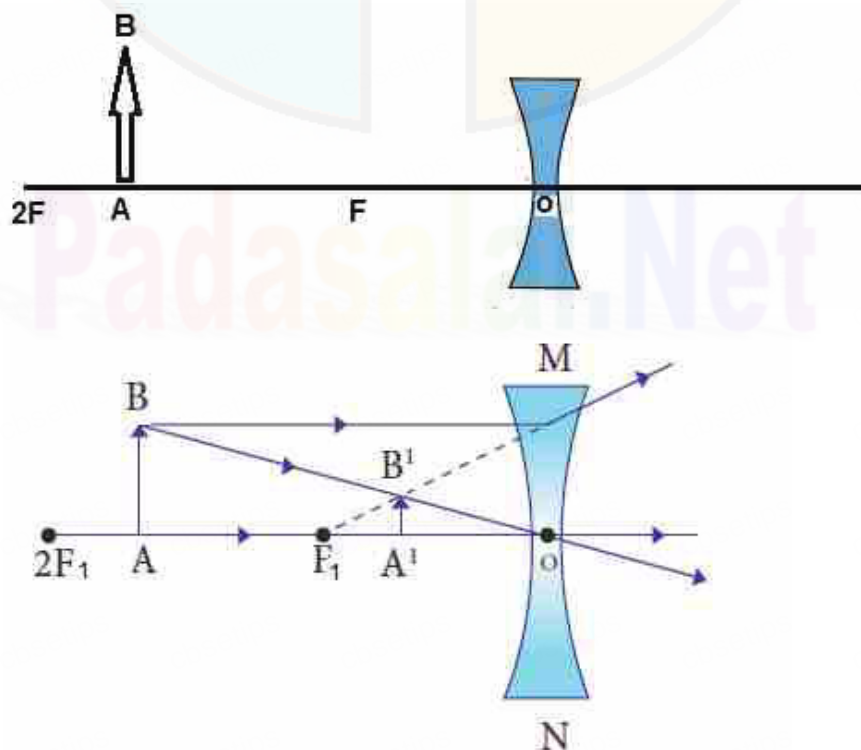
1. d) 1 dyne
2. b) an ideal gas
3. b) 20 kHz
4. c) homo atomic molecule
5. c) A-ii, B-iii, C-iv, D-i
6. v) $\text{CH}_4 < \text{CH}_2 = \text{CH}_2 < \text{CH} \equiv \text{CH}$
7. a) root hair
8. b) Insulin
9. d) Charles Darwin
10. c) Carcinoma
11. a) Tidal energy
12. c) file

PART - II

II. i) Answer any seven questions (Q.No.22 is compulsory)

7 x 2 = 14

13. Complete the ray diagram of a concave lens



14. A container whose capacity is 70 ml is filled with a liquid up to 50 ml. Then, the liquid in the container is heated. Initially, the level of the liquid falls from 50 ml to 48.5 ml. Then we heat more, the level of the liquid rises to 51.2 ml. Find the apparent and real expansion.

Data:

Level of the liquid $L_1 = 50$ ml

Level of the liquid $L_2 = 48.5$ ml

Level of the liquid $L_3 = 51.2$ ml

Apparent expansion = $L_3 - L_1$
= $51.2 \text{ ml} - 50 \text{ ml} = 1.2 \text{ ml}$

Real expansion = $L_3 - L_2$
= $51.2 \text{ ml} - 48.5 \text{ ml} = 2.7 \text{ ml}$

So, Real expansion > apparent expansion

15. Match the following

- | | |
|--------------|-------------------|
| a. Fuel | i) lead |
| b. Moderator | ii) heavy water |
| c. Coolant | iii) cadmium rods |
| d. Shield | iv) uranium |

Ans:

- | | |
|--------------|-------------------|
| a. Fuel | iv) uranium |
| b. Moderator | ii) heavy water |
| c. Coolant | iii) cadmium rods |
| d. Shield | i) lead |

16. What is the pH value of 1.0×10^{-5} M KOH solution ?

Given: $[\text{OH}^-] = 1 \times 10^{-5}$ M

We can calculate pOH of solution as - $\text{pOH} = -\log [\text{OH}^-]$

$$\text{pOH} = -\log(1 \times 10^{-5})$$

$$\text{pOH} = -(\log(1) + \log 10^{-5})$$

$$\text{pOH} = -(0 - 5 \log 10)$$

$$\text{pOH} = -(0 - 5 \times 1)$$

$$\text{pOH} = 5$$

So now pH of the solution will be

$$\text{pH} = 14 - \text{pOH}$$

$$\text{pH} = 14 - 5$$

$\text{pH} = 9$, Therefore, **pH of the KOH solution is - 9.**

17. How is diastema formed in rabbit?

The gap between the incisors and premolar is called **diastema**. It helps in mastication and chewing of food in herbivorous animals.

18. Write the functions of cerebellum.

Maintenance of posture and balance, coordinate voluntary muscle activity.

19. Write the characteristics of insect pollinated flowers.

To attract insects these flowers are brightly coloured, have smell and nectar. The pollen grains are larger in size, the exine is pitted, spiny etc.

20. What is meant by transgenic organisms?

Plants or animals expressing a modified endogenous gene or a foreign gene are also known as **transgenic organisms**.

21. What are e-wastes generated?

E-wastes are generally called as **electronic wastes**, which includes the spoiled, outdated, non-repairable electrical and electronic devices.

These wastes contain toxic metals like lead, cadmium, chromium and mercury, though also contain iron, copper, silicon, aluminum and gold which can be recovered.

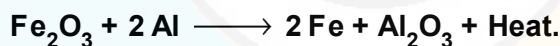
Nevertheless, only 5 % of e-wastes produced are recycled.

22. i) 'X' is an element that belongs to 1st group of the modern periodic table. 'X' is a gas and its covalent radius value is $0.37 \overset{\circ}{\text{A}}$. Identify and write the chemical symbol of 'X'.

1. An element 'X' is Hydrogen. It belongs to 1st group and its covalent radius value is 0.37.
2. Chemical symbol of 'X' is - H.

ii) A is a metal and belongs to Boron family in the modern periodic table acts as a good reducing agent. It reduces iron oxide into iron. It is used to make household utensils. Write the balanced chemical equation for the reduction of iron oxide by 'A'.

- 1) 'A' is a Aluminium metal belongs to boron family.
- 2) Al is used to make household utensils
It reduces iron oxide into iron.



PART - III

III. Answer any seven questions: (Q.No.32 is compulsory)

7 x 4 = 28

23. i) Convert 80°F temperature into kelvin scale.

$$\begin{aligned} \text{Fahrenheit and Kelvin: [K]} &= (F + 460) \times \frac{5}{9} \\ &= (80 + 460) \times \frac{5}{9} \\ &= 300 \text{ K} \end{aligned}$$

ii) Write any two advantages of LED TV over the normal TV?

- 1) It has brighter picture quality.
- 2) It is thinner in size.
- 3) Its life span is more
- 4) It is more reliable

24. i) Why does sound propagate faster on a rainy season than on summer season ?

When humidity increases, the speed of sound increases. That is why you can hear sound from long distances clearly during rainy seasons.

ii) Use the analogy to fill the blank:

- | | |
|--------------------------------|------------------------|
| a) Nuclear fission : Atom bomb | Nuclear fusion : |
| b) Radio Iodine : Goitre | Radio sodium |

Ans: a) Hydrogen bomb

b) used for the effective functioning of heart.

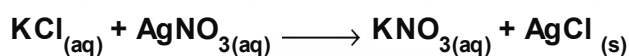
25.i) Renu dissolves 50 g of sugar in 250 ml of hot water, Banu dissolves 50 g of same sugar in 250 ml of cold water. Who will get faster dissolution of sugar? and Why?

A greater amount of sugar will dissolve in hot water than in cold water. So, Renu will get faster dissolution of 50g of sugar in 250 ml.

Reason:

The faster (hotter) the water molecules are moving, the more energy they give to the sugar molecules when they collide with them.

ii) When an aqueous solution of potassium chloride is added to an aqueous solution of silver nitrate, a white precipitate is formed. Give the chemical equation of this reaction.



It is an example of double displacement reaction

iii) Generally the rate of a chemical reaction increases on raising the temperature. Why?

The Most of the reactions go faster at higher temperature. Because adding heat to the reactants provides energy to break more bonds and thus speed up the reaction.

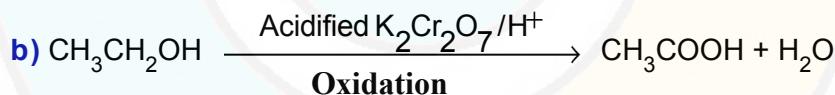
26.i) Give the balanced chemical equation of the following reactions:

a) Neutralization of NaOH with ethanoic acid.

b) Oxidation of ethanol by acidified potassium dichromate.



sodium acetate



ii) Can a nickel spatula be used to stir copper sulphate solution? Justify your answer.

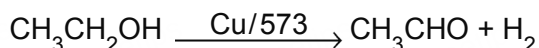
The standard electrode reduction potentials are:

Since the EMF of the cell is positive the reaction will occur and Nickel will displace copper from its solution and copper will be deposited on the nickel spatula.

Thus, Nickel cannot be used as to stir the copper sulphate solution.

27. Compound A is a colourless liquid having burning taste. When the vapour of compound A is passed over heated copper at 573 K, it is dehydrogenated to acetaldehyde. What is compound 'A'? What is the role of copper in this chemical reaction? Write the balanced chemical equation of this reaction.

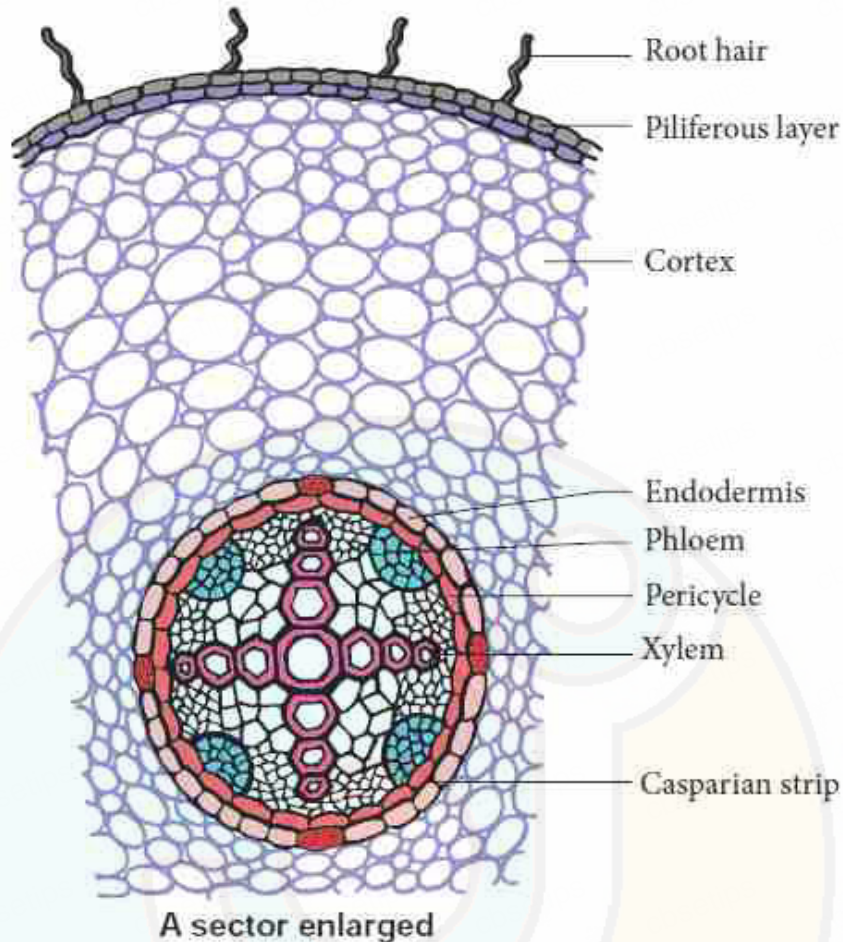
Compound - A is Ethanol (burning taste)



Role of copper:

The copper helps to complete the dehydrogenation and here the copper helps to lose the hydrogen of ethyl alcohol and give an aldehyde (acetaldehyde).

28. Draw the structure of a dicot root and label the parts



29. i) Correct the false statement

- a) The vas deferens serves to transport the ovum.
- b) The cerebral hemispheres of rabbit are connected by band of nerve tissue called corpora quadrigemina.

Ans:

- a) **False:** The vas deferens serves to transport the **sperms**.
- b) **False:** The cerebral hemispheres of rabbit are connected by band of nerve tissue called **corpus callosum**

ii) Who discovered Rh factor ? Why it is called as Rh factor?

Rh factor was discovered by Landsteiner and Wiener. It is named after **Rhesus monkey**

30.i) How does developing embryo gets its nourishment inside the mother's body?

The placenta is a disc shaped structure attached to the uterine wall and is a temporary association between the developing embryo and maternal tissues.

It allows the exchange of food materials, diffusion of oxygen, excretion of nitrogenous wastes and elimination of carbon dioxide.

ii) Discuss the method of plant breeding for disease resistance.

1. Introduction of new varieties of plants

It is a process of introducing high yielding varieties of plants from one place to another. Such plants are called as **exotic species**.

2. Selection

Methods of selection: There are three methods of selection. They are

1. Mass selection
2. Pureline selection
3. Clonal selection

3. Polyploidy breeding:

Sexually reproducing organisms have two complete set of chromosomes in their somatic cells.

4. Mutation breeding

It is a process by which **genetic variations** are created which in turn brings about changes in the organism.

5. Hybridization :

Hybridization may be defined as the process of crossing two or more types of plants for bringing their desired characters together into one progeny called **hybrid**.

31. Natural selection is a driving force for evolution-How?

1) Overproduction Living beings have the ability to reproduce more individuals and form their own progeny.

2) Struggle for existence :

Due to over production, a geometric ratio of increase in population occurs

The struggle for existence are of three types:

- a. Intraspecific struggle
- b. Interspecific struggle
- c. Environmental struggle

3) Variations

The occurrence of variation is a characteristic feature of all plants and animals

4) Survival of the fittest or Natural selection

During the struggle for existence, the organisms which can overcome the challenging situation, **survive** and **adapt** to the world, a number of islands including the **Galapagos island** and **Pacific island**

5). Origin of species

According to Darwin, **new species originates by the gradual accumulation of favourable variations** for a number of generations.

32. i) At what height from the centre of the Earth the acceleration due to gravity will be $\frac{1}{4}$ of its value as at the Earth.

Data: Height from the centre of the Earth, $R' = R + h$

The acceleration due to gravity at that height, $g' = \frac{g}{4}$

Formula $g = \frac{GM}{R^2}$

$$\frac{g}{g'} = \left(\frac{R'}{R}\right)^2 = \left(\frac{R+h}{R}\right)^2 = \left(1 + \frac{h}{R}\right)^2$$

$$4 = \left(1 + \frac{h}{R}\right)^2$$

$$2 = 1 + \frac{h}{R}$$

$$h = R, \quad R' = 2R$$

Q) In common what is the value of least distance of distinct vision of a human

Least distance of distinct vision of a human eye is **25 cm**.

PART - IV

i) Answer all the questions

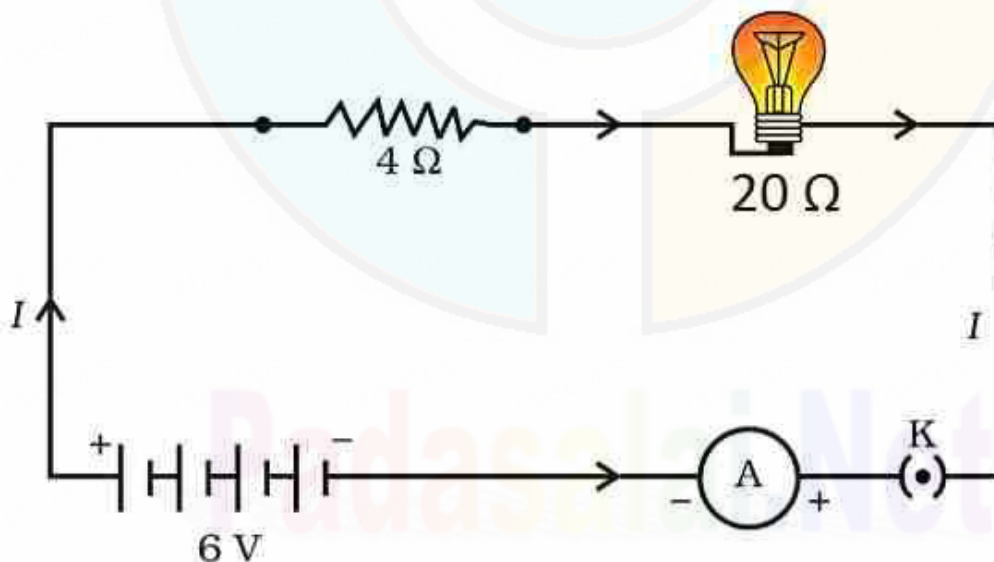
3 x 7 = 21

ii) Each question carries seven marks.

iii) Draw the diagram wherever necessary.

33A.i) Differentiate the eye defects: Myopia and Hypermetropia

Myopia,	Hypermeteropia
1) short sightedness, occurs due to the shortening of eye ball	1) Long sightedness, occurs due to the lengthening of eye ball.
2) Nearby objects can be seen clearly but distant objects cannot be seen clearly	2) Distant objects can be seen clearly but nearby objects cannot be seen clearly
3) The focal length of eye lens is reduced or the distance between eye lens and retina increases.	3) The focal length of eye lens is increased or the distance between eye lens and retina decreases
4) Thee image of distant objects are formed before the retina.	4) The image of nearby objects are formed behind the retina.
5) This defect can be corrected using a concave lens	5) This defect can be corrected using a convex lens
6) The focal length of the required concave lens is, $f = \frac{xy}{x - y}$	6) The focal length of the required convex lens is, $f = \frac{dD}{d - D}$



ii) An electric lamp of resistance 20 ohm and a resistance of 4 ohm are connected in series to a 6 V battery as shown in the figure.

a) Find the total resistance of the circuit.

b) Find the current flowing through the circuit.

c) Find the potential difference across the resistance.

a) Find the total resistance of the circuit.

Rotal resistance:

$$R = R_1 + R_2$$

$$R = 20 \Omega + 4 \Omega = 24 \Omega$$

b) Find the current flowing through the circuit.

$$\text{Ohm law } V = IR \quad , \quad I = \frac{V}{R} = \frac{6}{24} = 0.25 \text{ A}$$

c) Find the potential difference across the resistance.

Potential difference across the electric lamp :

$$V_1 = I R_1 \qquad V_1 = 0.25 \times 20 = 5 \text{ V}$$

Potential difference across the conductor :

$$V_2 = I R_2 \qquad V_2 = 0.25 \times 4 = 1 \text{ V}$$

(OR)

33B. i) What is the co-efficient of cubical expansion?

If there is an increase in the volume of a solid body due to heating, then the expansion is called **cubical or volumetric expansion**.

ii) Explain why, the ceilings of concert halls are curved.

When a person is talking at one focus, his voice can be heard distinctly at the other focus. It is due to the multiple reflections of sound waves from the curved walls.

iii) Differentiate Nuclear fission and nuclear fusion .

S.No.	NUCLEAR FISSION	NUCLEAR FUSION
1	The process of breaking up (splitting) of a heavy nucleus into two smaller nuclei is called 'nuclear fission'.	Nuclear fusion is the combination of two lighter nuclei to form a heavier nucleus.
2	Can be performed at room temperature.	Extremely high temperature and pressure is needed.
3	Alpha, beta and gamma radiations are emitted.	Alpha rays, positrons, and neutrinos are emitted.
4	Fission leads to emission of gamma radiation. This triggers the mutation in the human gene and causes genetic transform diseases.	Only light and heat energy is emitted.

34A. Derive the relationship between Relative molecular mass and Vapour density.

$$\text{Vapour Density (V.D.)} = \frac{\text{Mass of a given volume of gas or vapour at S.T.P.}}{\text{Mass of the same volume of hydrogen}}$$

According to Avogadro's law, equal volumes of all gases contain equal number of molecules.

Thus, let the number of molecules in one volume = n, then

$$\text{V.D at STP} = \frac{\text{Mass of 'n' molecules of a gas or vapour at S.T.P.}}{\text{Mass of 'n' molecules of hydrogen}}$$

Cancelling 'n' which is common, you get

$$\text{V.D} = \frac{\text{Mass of 1 molecules of a gas or vapour at S.T.P.}}{\text{Mass of 1 molecules of hydrogen}}$$

However, since hydrogen is diatomic

$$V.D = \frac{\text{Mass of 1 molecules of a gas or vapour at S.T.P.}}{\text{Mass of 2 atoms of hydrogen}}$$

$$VD = \frac{\text{Mass of 1 molecule of a gas or vapour at STP}}{2 \times \text{Mass of 1 atom of hydrogen}}$$

$$\text{Relative molecular mass} = \frac{\text{Mass of 1 molecule of a gas or vapour at STP}}{\text{Mass of 1 atom of hydrogen}}$$

(hydrogen scale)

$$V.D = \frac{\text{Relative molecular mass}}{2}$$

Now on cross multiplication, you have

$$2 \times \text{vapour density} = \text{Relative molecular mass of a gas}$$

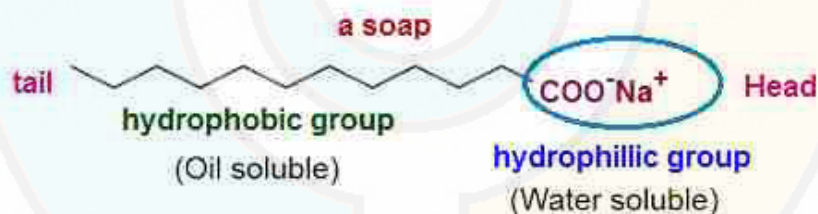
(Or)

$$\text{Relative molecular mass} = 2 \times \text{Vapour density}$$

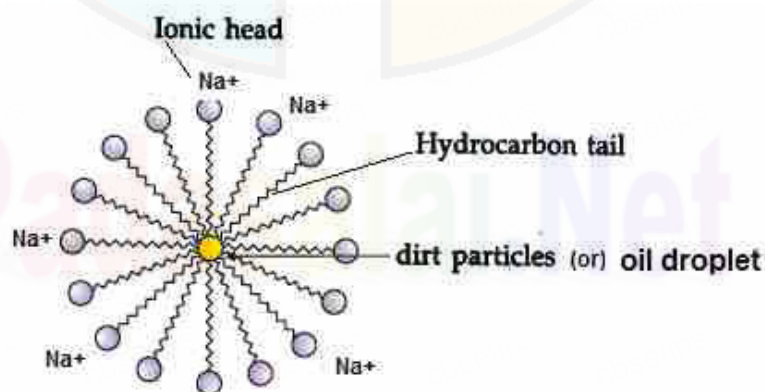
ii) Explain the mechanism of cleansing action of soap.

A soap molecule contains two chemically distinct parts that interact differently with water.

- One polar end, which is a short head with a carboxylate group ($-\text{COO}^-\text{Na}^+$)
- One non-polar end having the long tail made of the hydrocarbon chain.



When a soap or detergent is dissolved in water, the molecules join together as clusters called 'micelles'.



Their long hydrocarbon chains attach themselves to the oil and dirt. The dirt is thus surrounded by the non-polar end of the soap molecules. The charged carboxylate end of the soap molecules makes the micelles soluble in water. Thus, the dirt is washed away with the soap.

34B. i) Give the reason for the following statements on the periodic trends in modern periodic table of elements

a) Along the period, from left to right, the atomic radius values of the elements decrease whereas along the group, from the top to bottom, the atomic radius value increases.

Left to right:

- Reason**
- i) The number of valence electrons increases
 - ii) Nuclear charge increases
 - iii) Size of atom decrease

Top to bottom:

- Reason**
- i) The number of valence Shell increases
 - ii) Nuclear charge decrease
 - iii) Size of atom increase

b) The electron affinity values increases along the period from left to right and decrease down the group

Left to Right :

Reason : Atomic radius decreases and so, electron affinity increases

Top to bottom:

Reason: Atomic radius increases and so, valence electrons are loosely bound. Therefore electron affinity decreases.

c) The ionization energy values increase along the period from left to right and decrease down the group

Left to Right:

Reason: The valence electrons get closer to the nucleus of an atom as we move from left to right due to increased nuclear charge.

Top to bottom:

Reason: IE decreases as the atomic size increases with corresponding increase in number of shells and thereby decrease in effective nuclear charge.

ii) What is the role of manganese dioxide in the heating reaction of potassium chlorate for the production of oxygen gas?

- i) O_2 is prepared in the laboratory by heating $KClO_3$ which requires to be heated up to a temperature of $630^\circ C$. It is dangerous too.
- ii) But MnO_2 acts as a positive catalyst which enables the reaction to take place at $200-240^\circ C$ at a much faster rate.

35A. i) What is parthenocarpic fruit? Give an example.

Parthenocarpic fruits are seedless fruits which are produced without fertilisation, e.g Watermelon, Tomato, banana is naturally Parthenocarpic.

We can induce parthenocarpy by spraying hormones and get seedless fruits.

ii) 'A' is a cylindrical structure that begins from the lower end of medulla and extend downwards. It is enclosed in bony cage 'B' and covered by membranes 'C'. As many as 'D' pairs of nerves arise from the structure 'A'.

a) What is A?

b) Name (a) bony cage 'B' and (b) membranes 'C'

c) How much is D?

Ans:

(a) A is Spinal cord

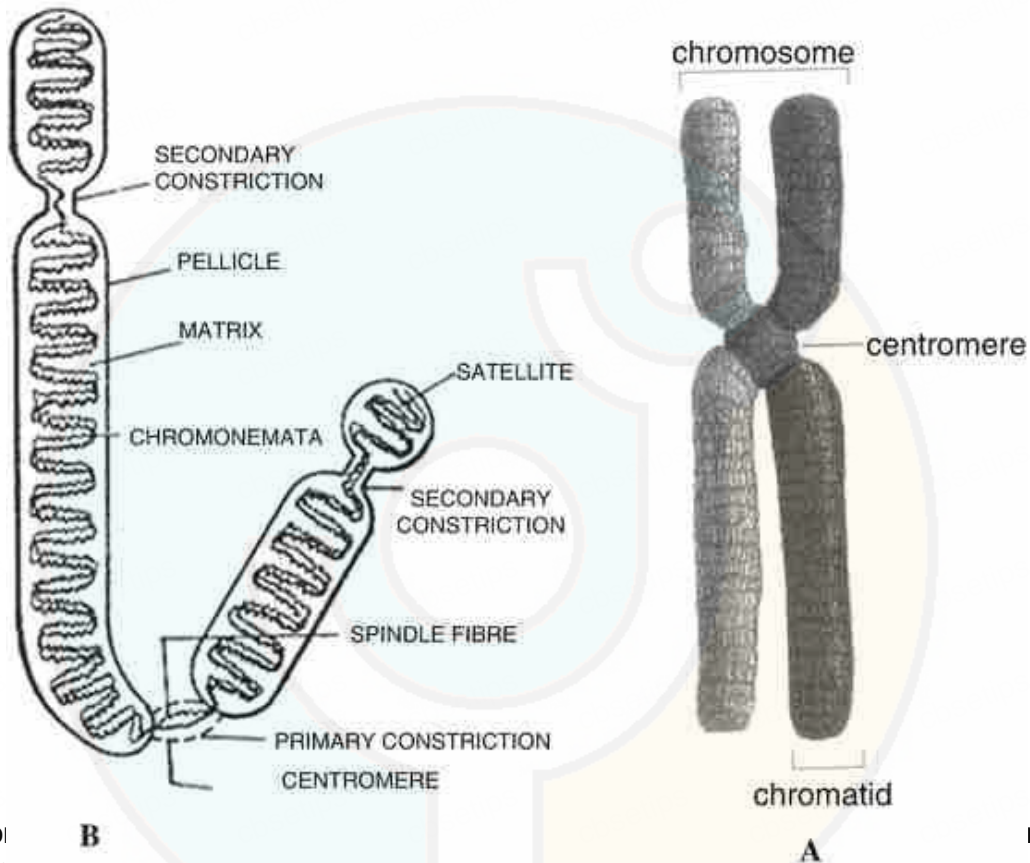
(b) B Bony cage 'B' is Vertebral column

b) Membrane 'C' are are Duramater, Arachnoid, membrane and piamater of Meninges

c) D - 31 Pairs of nerves.

(OR)

35B.i) Explain the structure of a chromosome.



The chromatid is held together by the centromere. Each chromatid is made up of spirally coiled thin structure called chromonema.

The chromonema has number of bead-like structures along its length which are called chromomeres.

The chromosomes are made up of DNA, RNA, chromosomal proteins (histones and non-histones) and certain metallic ions.

These proteins provide structural support to the chromosome .

ii) Regular physical exercise is advisable for normal functioning of human body. What are the advantages of practising exercise in daily life?

- 1) It Can Make You Feel Happier. ...
- 2) It Can Help With Weight Loss. ...
- 3) It Is Good for Your Muscles and Bones. ...
- 4) It Can Increase Your Energy Levels. ...
- 5) It Can Reduce Your Risk of Chronic Disease.
- 6) It Can Help Skin Health. ...
- 7) It Can Help Your Brain Health and Memory.
- 8) It Can Help With Relaxation and Sleep Quality.