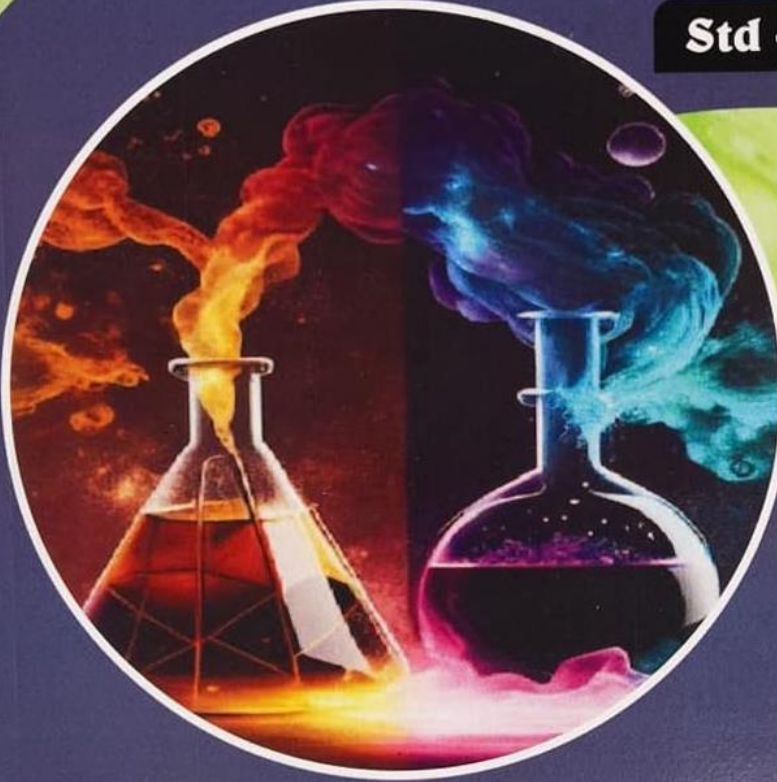


My Favorite Guide On **GENERAL SCIENCE**

सामान्य विज्ञान

Std - 8th - Semi English



Strictly As Per
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महाराष्ट्रात 11th आणि 12th (Science) ची पुस्तके
प्रथमच... English व Scientific मराठी मधून...

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TOPIC - 01

LIVING WORLD AND CLASSIFICATION OF MICROBES

Living World and Classification of Microbes (सजीव सृष्टी व सूक्ष्मजीवांचे वर्गीकरण)

Q.1 What is the hierarchy for classification of living organisms?

Ans: The hierarchy for classification is as follows: Kingdom, Phylum, Class, Family, Genus and species.

Q.2 Who invented 'binomial system of nomenclature'?

Ans: Carl Linnaeus invented 'binomial system' of nomenclature.

Q.3 Which levels of hierarchy are considered while writing the name in binomial nomenclature?

Ans: The levels of hierarchy considered while writing the name in binomial nomenclature, are genus and species. The genus is written by the first word and the species is shown by the second word.

1.1 Biodiversity and need of classification

Last year we learnt that all the living organism on earth have adapted according to geographic regions, food ingestion, defense etc. While adapting, many differences are observed in the organisms of same species too.

According to 2011 census, around 87 million species of living organisms are found on the earth- including land and sea. To study such a vast number, it was essential to divide them into groups. So and subgroups were created considering the similarities and differences among the living organisms.

This process of dividing living organism into groups and subgroups is called Biological classification.

Biodiversity and need of classification (जैवविविधता व वर्गीकरणाची आवश्यकता) -

मागील इयत्तेत आपण पाहिले की geographic regions (भौगोलिक प्रदेश), food ingestion (अन्नग्रहण), defence (संरक्षण) अशा विविध कारणांनी पृथ्वीवरील सजीवांत adapting (अनुकूलन) झालेले आढळते. अनुकूलन साधताना एकाच जातीच्या organisms (सजीवांतही) विविध बदल झालेले दिसतात.

2011 च्या गणनेनुसार पृथ्वीवरील land and sea (जमीन व समुद्र) यांमधील सर्व सजीव मिळून सुमारे 87 दशलक्ष जाती ज्ञात आहेत. एवढ्या vast number (प्रचंड संख्येने) असणाऱ्या सजीवांचा अभ्यास करण्यासाठी त्यांची गटांत divide (विभागणी) व्हायला हवी, अशी गरज भासली. सजीवांतील similarities and differences (साम्य व विविधता) लक्षात घेऊन त्यांचे गट व उपगट करण्यात आले.

सजीवांचे गट व subgroups (उपगट) बनविण्याच्या या प्रक्रियेला Biological classification (जैविक वर्गीकरण म्हणतात).

Q.4 Which criteria is used by whittaker for the classification?

Ans: Robert Harding Whittaker (1920-1980) was an American Ecologist. In 1969 he divided living organisms into 5 groups.

For this classification Whittaker considered following criteria:

1) Complexity of cell structure:

Prokaryotic and Eukaryotic.

2) Complexity of organisms:

Unicellular or Multicellular.

3) Mode of nutrition:

Plants – Autotrophic - Photosynthetic

Fungi – Saprophytic - Absorption from dead organisms.

Animals- Heterotrophic and ingestive.

4) Life style:

Plants - Producers

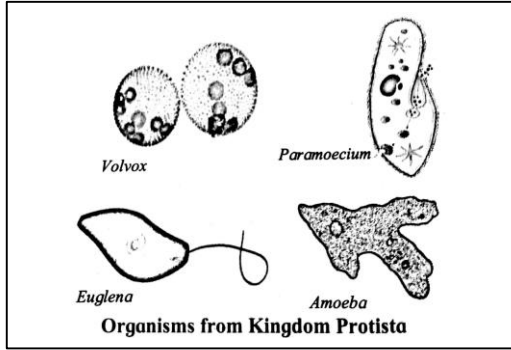
Animals - Consumers

Fungi - Decomposers

5) Phylogenetic relationship:

Prokaryotic to Eukaryotic, unicellular to multicellular.

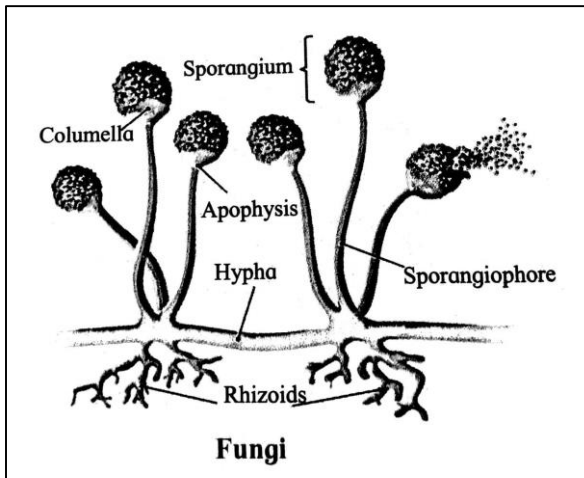
- ii) Locomotion (प्रचलनासाठी) pseudopodia (छद्मपाद) किंवा cilia (रोमके) किंवा flagella (कशाभिका) असतात.
- iii) स्वयंपोषी उदा. युग्लिना, क्लॉल्व्हॉक्स पेशीत chloroplast (हरितलवके) असतात. परपोषी उदा. अमिबा, पॅरामेशिअम, प्लास्मोडिअम, इत्यादी.



Kingdom - 3: Fungi

सृष्टी - 3: Fungi (कवके)

Activity: Take a moist piece of bread or bhakri and keep it in a container with lid for 2-3 days. After 2-3 days a fine cotton thread like tuft is found growing on the surface of the bread. Prepare a temporary mount of few threads from this culture and observe it under the microscope.



Q.7 What are the characteristics of Kingdom Fungi?

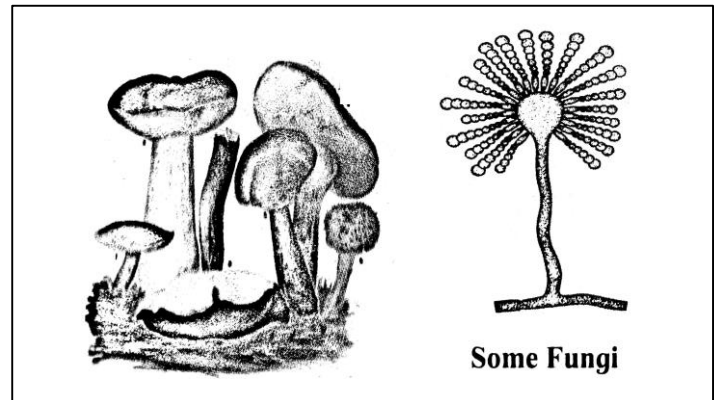
Ans: Characteristics of Kingdom Fungi:

- i) These are non-green, eukaryotic, heterotrophic organisms.

- ii) Most of them are saprotrophs. They feed upon decaying organic matter.
- iii) Their cell wall is made up of tough and complex sugar called 'Chitin'.
- iv) Some fungi are thread like and many nuclei are present in the cytoplasm.
- v) Examples- Baker's yeast, Aspergillus (Fungus on corn), Penicillium, Mushrooms.

Characteristics:

- i) कवक सृष्टीत heterotrophic (परपोषी), non-green (असंश्लेषी) व eukaryotic (दृश्यकेंद्रकी) सजीवांचा समावेश होतो.
- ii) बहुसंख्य कवके saprotrophs (मृतोपजीवी) आहेत. Decaying organic matter (कुजलेल्या कार्बनी पदार्थावर) जगतात.
- iii) कवकांची cell wall (पेशीभित्तिका) chitin ('कायटीन') या complex sugar (जटील शर्करेपासून) बनलेली असते.
- iv) काही कवके thread like (तंतुरूपी) असून आतील cytoplasm (पेशीद्रव्यात) असंख्य nuclei (केंद्रे) असतात.
- v) कवक - किण्व (बेकर्स यीस्ट) बुरशी, अँस्पेरजिलस, (मक्याच्या कणसावरील बुरशी), पेनिसिलिअम, भुछत्रे (मशरूम).



Though many systems of classification are introduced after the Whittaker's, his five kingdom system is widely accepted.

1.3. Classification of Microbes:

Q.8 Give the classification of Microbes?

Ans: Classification of Microbes:

Among the living organisms, microorganisms are largest in number. Hence they are classified as follows.

Classification of microbes (सूक्ष्मजीवांचे वर्गीकरण) -

Q.3 Complete the following table:

Mass (kg)	Volume (m ³)	Density (kg/m ³)
350	175	
.....	190	4

Ans: Using the formula.

density = mass/volume

Mass (kg)	Volume (m ³)	Density (kg/m ³)
350	175	<u>2</u>
<u>760</u>	190	4

Q.4 Define pressure.**Ans:** The force exerted perpendicularly on a unit area is called pressure.**Pressure (दाब):** Unit area (एकक क्षेत्रफळावर) perpendicularly (लंब दिशेत) प्रयुक्त असणाऱ्या force (बलास) दाब म्हणतात.**Q.5 Why do the load carrying heavy vehicles have large number of wheels?****Ans:**

- i) The pressure produced by a given force depends on the area of the surface on which the force acts.
- ii) The greater the surface area, the less is the pressure produced.
- iii) Load carrying heavy vehicles have large number of wheels so that the load (weight) is distributed over large surface area of the wheels in contact with the road.
- iv) Hence, the pressure decreases and the tyres do not burst.

5) माल वाहून नेणाऱ्या heavy vehicles (अवजड वाहनांच्या) चाकांची संख्या large (जास्त) का असते?

- i) ठराविक बलामुळे निर्माण होणारा दाब बल लावलेल्या area of the surface (पृष्ठभागाच्या क्षेत्रफळावर) depend (अवलंबून) असतो.

ii) क्षेत्रफळ जेवढे जास्त तेवढा pressure (दाब) less (कमी) होतो.

iii) अवजड वाहनांच्या wheels (चाकांची) संख्या जास्त ठेवल्याने contact with the road (रस्त्याच्या संपर्कात येणारे) चाकांच्या भागांचे क्षेत्रफळ वाढते.

iv) परिणामी pressure decreases (दाब कमी) होतो व टायर burst (फुटत) नाहीत.

Q.6 Why does it happen? The wall of a dam is broad at its base.**Ans:** i) The pressure at a point in a liquid is proportional to the height of the liquid column above it. Hence, the pressure of water in a dam is much greater at the bottom of the dam than at the top.

ii) To withstand this high pressure, the wall of a dam is made stronger and thicker (broad) at the base than at the top.

Q.6 Dam (धरणाची) wall (भित) वरच्यापेक्षा तळाशी thicker (अधिक रूंद) व stronger (अधिक मजबूत) का बनवलेली असते? किंवा असे का घडते? धरणाची भित तळाशी broad (रूंद) असते.

i) Pressure at a point in a liquid (द्रवाचा दाब) द्रवातील खोलीनुसार वाढत जातो. त्यामुळे Pressure of water in a dam (धरणातील पाण्याचा दाब) वरच्यापेक्षा bottom (तळाशी) खूपच जास्त असतो.

ii) या high pressure (प्रचंड दाबामुळे) धरणाच्या भिंतीला तडे जाऊ नयेत अथवा ती पडू नये, यासाठी ती वरच्यापेक्षा तळाशी अधिक thicker (रूंद) व अधिक stronger (मजबूत) बनवलेली असते.

Solved / Unsolved Problems/Numerical:

Example: 1) The area of the bottom of a tiffin box is 0.25 m^2 and weight is 50 N , Calculate the pressure exerted by box on the shelf.

Given: Area = 0.25 m^2 , weight of box = 50 N , Pressure = ?

Solution:

$$\text{Pressure} = \frac{\text{Force}}{\text{area}} = \frac{50 \text{ N}}{0.25 \text{ m}^2} = 200 \text{ N/m}^2$$

Example: 2) Calculate the relative density of iron if the density of water is 10^3 kg/m^3 and the density of iron is $7.85 \times 10^3 \text{ kg/m}^3$.

Given: density of water = 10^3 kg/m^3 , density of iron = $7.85 \times 10^3 \text{ kg/m}^3$

Relative density of iron = ?

$$\text{Relative density of iron} = \frac{(\text{density of iron})}{(\text{density of water})}$$

$$= \frac{7.85 \times 10^3 \text{ kg/m}^3}{10^3 \text{ kg/m}^3} = 7.85$$

Example: 3) The area of the tip of a screw is 0.5 mm^2 and its weight is 0.5 N . Calculate the pressure (in Pa) exerted by the screw on a wooden plank.

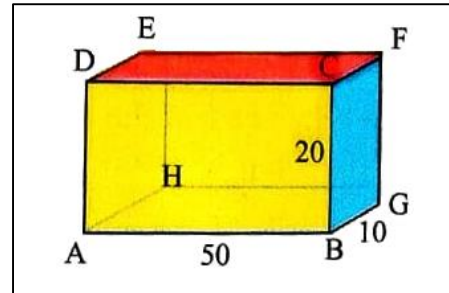
Given: Area = $0.5 \times 10^{-6} \text{ m}^2$

Weight of the screw = 0.5 N , Pressure = ?

$$\text{Pressure} = \frac{\text{weight}}{\text{area}} = \frac{0.5 \text{ N}}{(0.5 \times 10^{-6} \text{ m}^2)} = 10^6 \text{ N/m}^2$$

$$= 10^6 \text{ Pa}$$

Example: 4) Mass of a block of metal is 10 kg and its dimensions are length 50 cm , breadth 10 cm , height 20 cm . (See fig.) If the metal block is placed on the following surface on the table, find out on which of the surface ABCD, CDEF and BCFG will the pressure exerted on the table be maximum.



Given: Weight of the block = mg

$$= 10 \times 9.8 \text{ N} = 98 \text{ N}$$

For the surface ABCD, length = 50 cm , height = 20 cm .

$$\text{Area} = 50 \text{ cm} \times 20 \text{ cm}$$

$$= 1000 \text{ cm}^2 = 0.1 \text{ m}^2$$

$$\text{Pressure} = \frac{\text{weight}}{\text{area}} = \frac{98}{(0.1)} = 980 \text{ Pa}$$

For the surface CDEF, length = 50 cm , breadth = 10 cm

$$\text{Area} = 50 \text{ cm} \times 10 \text{ cm} = 500 \text{ cm}^2 = 0.05 \text{ m}^2$$

$$\text{Pressure} = \frac{\text{weight}}{\text{area}} = \frac{9800}{5} = 1960 \text{ Pa}$$

For the surface BCFG, height = 20 cm breadth = 10 cm

$$\text{Area} = 20 \text{ cm} \times 10 \text{ cm}$$

$$= 200 \text{ cm}^2$$

$$= 0.02 \text{ m}^2$$

$$\text{Pressure} = \frac{\text{weight}}{\text{area}} = \frac{98 \text{ N}}{0.02 \text{ m}^2}$$

$= 4900 \text{ Pa}$: Maximum Pressure. Hence, smaller the area of contact, large is the pressure.

Example: 5) A piece of marble tile weights 100 g in air. If its density is 2.5 g/cc , what will be its weight in water?

Given: Weight in air = 100 g

$$\text{Density} = 2.5 \text{ g/cc} \therefore \text{Volume} = 100 \text{ g} / (2.5 \text{ g/cc}) = 40 \text{ cc}$$

Therefore, according to Archimedes principle, when the piece is dipped in water, water of volume equal to the volume of the piece i.e. 40 cc will be displaced. The loss

TOPIC - 04

CURRENT ELECTRICITY AND MAGNETISM

Current Electricity and Magnetism (धाराविद्युत आणि चुंबकत्व)

Q.1 Which constituents are present in an atom?

Ans: Constituents present in an atom

- i) An atom has same number of positively charged protons and negatively charged electrons. So an object doesn't show any charge though its atoms contain charged particles.
- ii) Therefore, we can say that plenty of electrical charge is filled in the objects around us. What will happen if a glass rod is rubbed on a silk cloth? How do objects get charges? What are static and moving charges?
- iii) Moving charges get transferred from one object to the other.
- iv) These are negatively charged.
- v) Moving negatively charged particle are the electrons. Can this negative charge be made to flow? Can electricity be made to flow like water flowing from higher to lower level?
- vi) You have learnt that a force will have to be applied to put a stationary object into motion.
- vii) We get current electricity when the electrons in an electrical conductor are made to flow.

Constituents present in an atom:

Atom (अणूमध्ये) electron (इलेक्ट्रॉन) (ऋणप्रभारित कण) व proton (प्रोटॉन) (धनप्रभारित कण) असतात त्यामुळे एकंदरीत वस्तू विद्युतदृष्ट्या neutral (उदासीन) असते. तरीही त्यात atom (अणू) असल्याने त्यात electrons (ऋणप्रभार) व protons (धनप्रभार) असतोच. म्हणूनच असे म्हणता येईल, की आपल्या around us (सभोवतालच्या) वस्तूंमध्ये electrical charge (विद्युतप्रभार) plenty (भरपूर प्रमाणात) filled (भरून राहिलेला) असतो. काचेची कांडी रेशमी कापडावर rubbed (घासल्यावर) काय होते? वस्तू charge (प्रभारित) कशा होतात? Static (स्थिर) आणि चल प्रभार कशाला म्हणतात? Moving charges (चल विद्युत) एका वस्तूवरून दुसऱ्या वस्तूवर transferred (स्थानांतरित) होते. हा negative (ऋणप्रभार) होय. Moving negatively charged (चल ऋणप्रभारित कणांना) इलेक्ट्रॉन असे म्हणतात. हा ऋणप्रभार प्रवाही

करता येईल का? पाणी जसे higher to lower level (उंचावरून खालील भागाकडे) flow (वाहत) जाते, त्याप्रमाणे electricity (विद्युत प्रवाही) बनविता येईल का? stationary object (स्थिर वस्तूला) motion (गती) देण्यासाठी बल लावावे लागेल हे तुम्ही शिकला आहात. एखाद्या electrical conductor (सुवाहकामधील) इलेक्ट्रॉन्सना जर motion (गती) देऊन वाहते केले तर आपल्याला current electricity ('धारा विद्युत') मिळते.

Q.2 Explain Current Electricity.

Ans: Current Electricity:

- i) A large current flows when lightning takes place from a cloud to the ground, while sensation is felt by us due to a microscopically small current flowing to the brain.
- ii) You are aware of the current flowing through wires, electric bulbs, and equipment in the house.
- iii) In the electric cells of a radio or in a car battery, a current is produced by the flow of both negatively and positively charged particles

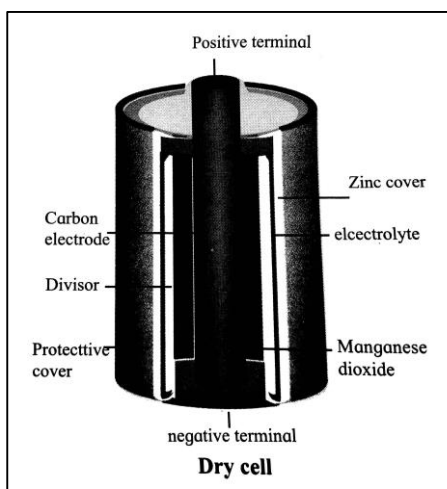
Current Electricity (धाराविद्युत): जेव्हा ढगातून जमिनीवर lightning (वीज) पडते तेव्हा मोठा current flow (विद्युतप्रवाह) वाहतो, तर कोणतीही sensation (संवेदना) आपल्याला brain (मेंदू) कडे जाणाऱ्या microscopically small (सूक्ष्म) विद्युतप्रवाहाने होते. घरामध्ये wires (तारांमधून), electric bulbs (विजेच्या बल्बमधून), equipment (उपकरणांमधून) flowing (वाहणाऱ्या) current (विद्युत) प्रवाहाचा तुम्हांला aware (परिचय) आहेच. रेडिओच्या electric cells (विद्युत घटांमधून) आणि मोटारीच्या बॅटरीमधून positively (धनप्रभारित) अन् negatively (ऋणप्रभारित) अशा दोन्ही particles (कणांच्या) वहनामुळे current (विद्युतप्रवाह) produce (निर्माण) होतो.

Q.3 Explain Electrostatic Potential

Ans: Electrostatic Potential:

- i) Water or a liquid flows from a higher level to a lower level.
- ii) Heat always flows from a body at higher temperature to a body at lower temperature.
- iii) Similarly, there is a tendency of the positive charge to flow from a point of higher electric level to a point of lower electric level.
- iv) This electric level deciding the direction of flow of electric charges is called electrostatic potential.

The construction of a dry cell is as shown in fig.

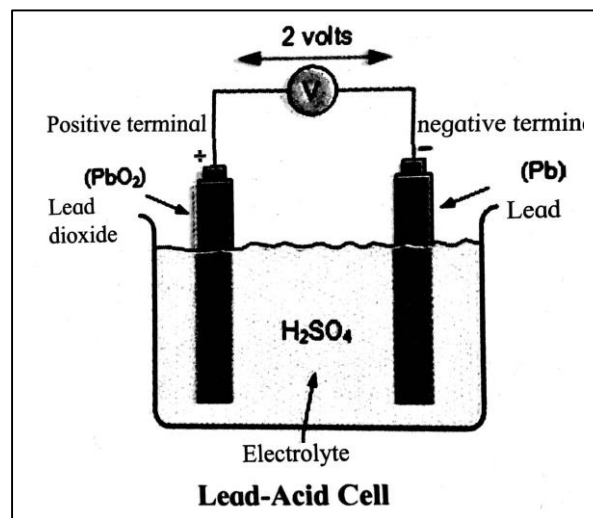


- i) Take a lead dry cell and remove its outer coating. Inside you will find a whitish, metal layer.
- ii) This is the Zinc (Zn) metal layer.
- iii) This is the negative terminal of the cell. Now, carefully break open this layer.
- iv) There is another layer inside. An electrolyte is filled between these two layers.
- v) The electrolyte contains negatively charged and positively charged ions.
- vi) These are the carriers of electricity. The electrolyte is a wet pulp of Zinc chloride (ZnCl_2) and Ammonium chloride (NH_4Cl).
- vii) There is a graphite rod at the centre of the cell. This is positive terminal of the cell.
- viii) A paste of Manganese dioxide (MnO_2) is filled outside the rod.
- ix) Because of the chemical reactions of all these chemicals, electrical charge is produced on the two terminals (graphite rod and zinc layer) and an electric current flows in the circuit.
- x) Due to the wet pulp used in this cell, the chemical reaction proceeds very slowly.
- xi) Hence a large electric current cannot be obtained from this Compared to the electric cells using liquids, the shelf life of dry cells is longer.
- xii) Dry cells are very convenient to use as these can be held in any direction with respect to ground and can be used in mobile instruments.

एक निकामी झालेला dry cell (कोरडा विद्युतघट) घेऊन त्याचे outer coating (बाहेरचे आवरण) काढा. त्याच्या आत एक whitish, metal layer (पांढरट धातूचे आवरण) दिसेल. हे जस्त (Zn) धातूचे layer (आवरण) होय. हेच cell (घटाचे) negative terminal (ऋण टोक). आता हेही layer (आवरण) break open (हलकेच फोडा). जस्ताच्या आवरणाच्या आत आणखी एक layer (आवरण) असते. या दोन्ही आवरणांमध्ये विद्युत electrolyte (अपघटनी) भरलेली असते. विद्युत electrolyte (अपघटनीमध्ये) negatively (धनप्रभारित) व positively (ऋणप्रभारित) ions (आयन) असतात. Carriers (त्यांच्यामार्फत) electric flow (विद्युतवहन) होते. ही अपघटनी म्हणजे ZnCl_2 (झिंक क्लोराईड) आणि NH_4Cl (अमोनियम क्लोराईड) यांच्या wet pulp (ओल्या मिश्रणाचा लगदा) असतो. घटाच्या center (मध्यभागी) एक ग्राफाइट कांडी असते. हे cell (घटाचे) positive terminal (धन टोक) असते. Outside the rod (कांडीच्या बाहेरील भागात) MnO_2 (मॅंगनीज डायॉक्साईड) ची पेस्ट भरलेली असते. या सर्व chemicals (रासायनिक पदार्थांच्या) chemical reactions (रासायनिक अभिक्रियेद्वारा) two terminals (दोन्ही टोकांवर) (graphite rod, zinc) charge (विद्युतप्रभार) तयार होतो व circuit (परिपथातून) electric current (विद्युतप्रवाह) flow (वाहतो).

Q.7 Draw a neat labelled diagram to show the design of the lead-acid cell and explain its principle of working.

Ans: Lead-Acid Cell:



- i) Figure shows the design of a Lead-Acid cell. Let us examine its principle. This type of cell can be recharged after getting electrically discharged.

- iv) The radioactive isotopes are used for detection of cracks (leakage) in the underground pipes. E.g. Sodium-24.
- v) Radioactive isotopes are used for food preservation from microbes.
- vi) The radioactive isotope C-14 is used for determining the age of archeological objects.

Uses of isotopes (समस्थानिकांचे उपयोग): काही elements (मूलद्रव्यांची) isotopes (समस्थानिके) radioactive (किरणोत्सारी) असतात. त्यांचा उपयोग various fields (विविध क्षेत्रांत) केला जातो. उदा. Industry (औद्योगिक क्षेत्र), agriculture (कृषी क्षेत्र), medicine (वैद्यक क्षेत्र), research field (संशोधन क्षेत्र).

i) युरेनियम - 235 चा used (उपयोग) nuclear fission (केंद्रकीय विखंडन) व production of electricity (वीजनिर्मितीसाठी) होतो.

ii) कॅन्सरसारख्या fatal diseases (प्राणघातक आजारांवरील) medical treatment (वैद्यकीय उपचारांमध्ये) काही मूलद्रव्यांच्या radioactive isotopes (किरणोत्सारी समस्थानिकांचा) उपयोग होतो. उदा. कोबाल्ट - 60.

iii) Goiter (गोंयटर) या thyroid gland (थायरोईड ग्रंथीच्या) disease (आजारावरील) treatment (उपचारांमध्ये) आयोडिन - 131 चा use (उपयोग) होतो.

iv) Radioactive isotope (किरणोत्सारी मूलद्रव्यांच्या समस्थानिकांचा) उपयोग underground pipes (जमिनीखालून गेलेल्या नळांमधील) cracks (चीरा) detection (शोधण्यासाठी) होतो. उदा. सोडियम-24.

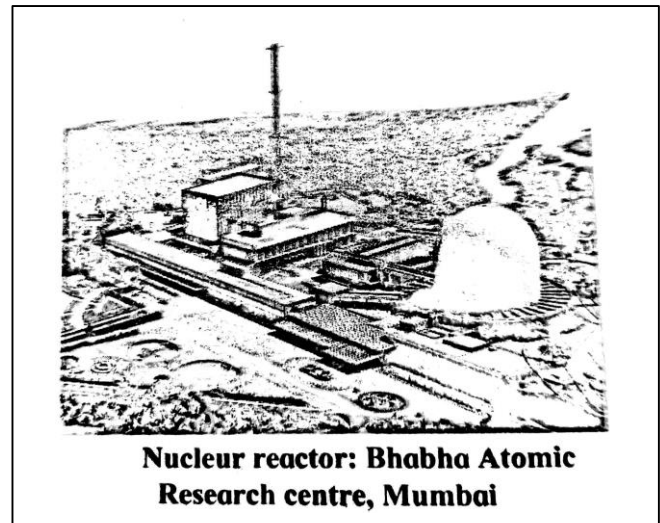
v) Food (अन्नपदार्थांचे) microbes (सूक्ष्म जीवाणूपासून) preservation (परिरक्षण) करण्यासाठी radioactive isotope (किरणोत्सारी मूलद्रव्यांचा) उपयोग होतो.

vi) C - 14 ह्या किरणोत्सारी समस्थानिकाचा use (उपयोग) archeological objects (जीवाश्मांचे) वय determining (ठरविण्यासाठी) होतो.

Q.11 Write a note on Nuclear Reactor.

Ans: Nuclear Reactor:

- i) Nuclear reactor is a machine that generates electricity on large scale by using atomic energy (See fig.).
- ii) In a nuclear reactor, the nuclear energy in atom is released by bringing about nuclear reactions on the nuclear fuel.



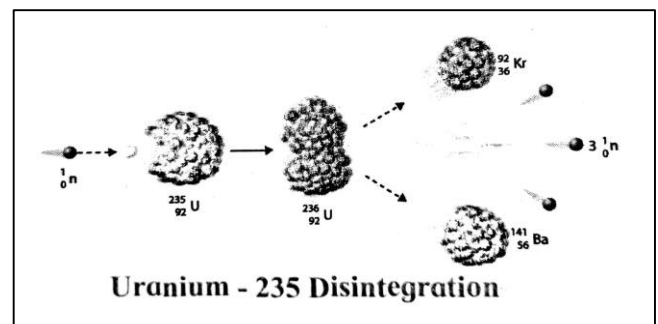
Nuclear reactor: Bhabha Atomic Research centre, Mumbai

iii) Let us understand a nuclear reaction with example of a nuclear fuel, namely, Uranium - 235. On bombardment with slow speed of neutrons, the nucleus of the isotope Uranium 235 undergoes nuclear fission to form nuclei of two different elements Krypton 92 and Barium 141 and 2 to 3 neutrons.

iv) On decreasing the speed these neutrons bring about fission of more U-235 nuclei.

v) In this way a chain reaction of nuclear fission takes place. (See the figure) A large amount of nuclear energy is released during a chain reaction of fission.

vi) The chain reaction is kept under control to prevent the probable explosion.



Nuclear Reactor (अणुभट्टी): Atomic energy (अणुऊर्जेच्या) वापराने मोठ्या प्रमाणावर generates electricity (वीजनिर्मिती) करण्याचे machine (संयंत्र) म्हणजे Nuclear reactor (अणुभट्टी). अणुभट्टीमध्ये nuclear fuel (अणुइंधनावर) nuclear reactions (केंद्रकीय अभिक्रिया) घडवून आणतात व अणूमधील nuclear energy (केंद्रकीय ऊर्जा) release (मुक्त) करतात. संबंधित nuclear reaction (केंद्रकीय अभिक्रिया) समजून घेण्यासाठी युरेनियम - 235 ह्या nuclear fuel (अणुइंधनाचे) उदाहरण घेऊ. slow speed (मंद गतीच्या)

न्यूट्रॉन्सचा bombardment (मारा केला) असता युरेनियम - 235 ह्या समस्थानिकाच्या nuclear fission (केंद्रकाचे विखंडन) होऊन क्रिप्टॉन - 92 व बेरियम 141 ह्या वेगळ्या मूलद्रव्यांची केंद्रे व 2 ते 3 न्यूट्रॉन निर्माण होतात. ह्या न्यूट्रॉन्सची decreasing the speed (गती कमी केल्यावर) ते आणखी U - 235 केंद्रकांचे fission (विखंडन) घडवतात. अशा प्रकारे nuclear fission (केंद्रकीय विखंडनाची) chain reaction (शृंखला अभिक्रिया) होते (आकृती पहा) यामध्ये केंद्रकातून मोठ्या प्रमाणात nuclear energy (केंद्रकीय ऊर्जा) म्हणजेच atomic energy (अणुऊर्जा) release (मुक्त) होते. Probable explosion (संभाव्य विस्फोट) prevent (टाळण्यासाठी) शृंखला अभिक्रिया control (नियंत्रित) ठेवतात.

Q.12 Define Moderator.

Ans: Moderator: Graphite or heavy water is used as moderator for reducing the speed of neutrons.

Moderator (संचलक / मंदक): न्यूट्रॉन्सचा speed (वेग) reducing (कमी) करण्यासाठी ग्रॅफाईट किंवा heavy water (जड पाणी) यांचा moderator (संचलक किंवा मंदक) म्हणून वापर केला जातो.

Q.13 What is Controller?

Ans: Controller:

- To reduce the number of neutron by absorbing them rods of boron, cadmium, beryllium etc. are used as controller.
- The heat produced in the fission process is taken out by using water as coolant.
- Water is transformed into steam.
- By means of this steam, turbines are driven and electricity is generated.

Controller (नियंत्रक): न्यूट्रॉन absorb (शोषून) घेऊन त्यांची reduce the number (संख्या कमी करण्यासाठी) बोरॉन, कॅडमियम, बेरिलियम इत्यादींच्या rods (कांड्या) controller (नियंत्रक) म्हणून वापरतात.

EXERCISES

Q.1 What is meant by matter?

Ans: Matter is made up of very small particles.

Q.2 What is an atom?

Ans: An atom is the smallest particle of an element which retains its chemical identity in all physical and chemical changes.

Q.3 What is the smallest unit of matter?

Ans: An atom is the smallest unit of matter.

Q.4 Rewrite the sentences after filling the blanks:

- Electron, proton, neutron are the types of in an atom.
- An electron carries a charge.
- The electron shell is nearest to the nucleus.
- The electronic configuration of magnesium is 2, 8, 2. From this it is understood that the valence shell of Magnesium is
- The valency of hydrogen is 'one' as per the molecular formula H_2O . Therefore valency of 'Fe' turns out to be as per the formula Fe_2O_3 .

Ans: 1) Electron, proton, neutron are the types of **subatomic particles** in an atom.

2) An electron carries a **negative** charge.

3) The electron shell **K** is nearest to the nucleus.

4) The electronic configuration of magnesium is 2, 8, 2. From this it is understood that the valence shell of Magnesium is **M**.

5) The valency of hydrogen is 'one' as per the molecular formula H_2O . Therefore valency of 'Fe' turns out to be **3** as per the formula Fe_2O_3 .

TOPIC - 06

COMPOSITION OF MATTER

Composition of Matter (द्रव्याचे संघटन)

Introduction:

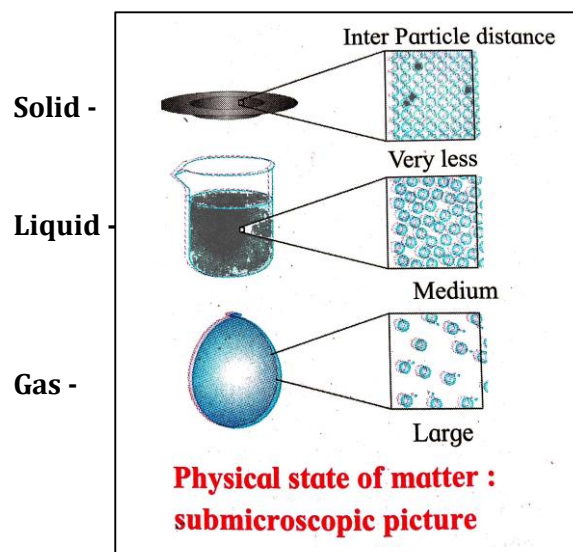
An intermolecular force of attraction acts between the particles (atom or molecules) of matter. The extent of the particle movement is determined by the strength of this force. The particles of solid are very close to each other and vibrate at their fixed positions. Due to this, solids get properties like definite shape and volume and also high density and non-compressibility. The strength of intermolecular force is moderate in the liquid state. Though it is not strong enough to fix the particles in definite position, it is strong enough to hold them together. As a result, liquids have definite volume. However they have fluidity and their shape is not definite but changes in accordance with the container. The intermolecular force is very weak in gases. Therefore the constituent particles of gases move freely and occupy all the available space. Consequently gases have neither definite shape nor definite volume.

Introduction (प्रस्तावना):

Particles of matter (द्रव्याच्या कणांमध्ये) (अणु किंवा रेणूंमध्ये) intermolecular force of attraction (आंतररेण्वीय आकर्षण बल) कार्यरत असते. ह्या strength of force (बलाच्या क्षमतेनुसार) extent of the particle movement (कणांच्या हालचालीचे प्रमाण ठरते). स्थायूंमध्ये intermolecular force (आंतररेण्वीय बल) अतिशय प्रभावी असते. त्यामुळे particles of solid (स्थायूचे कण) एकमेकांच्या अगदी जवळ असतात व ते आपापल्या vibrate at their fixed positions (ठराविक जागी स्पंद पावत) राहतात. यामुळे स्थायूंना definite shape (ठराविक आकार) व volume (आकारमान) प्राप्त होतात, तसेच high density (उच्च घनता) व non-compressibility (असंपीड्यता) हे properties (गुणधर्म) प्राप्त होतात. In liquid state (द्रव अवस्थेमध्ये) intermolecular force (आंतररेण्वीय बलाची) strength (सक्षमता) moderate (मध्यम) असते. ते fix the particles in definite position (कणांना ठराविक जागी अडकवून) ठेवण्याइतके strong (प्रभावी) नसले तरी त्यांचे hold them together (एकत्रित गठण) करण्यासाठी strong enough (पुरेसे प्रभावी) असते. त्यामुळे

द्रवांचे definite volume (आकारमान ठराविक) राहते. पण त्यांना fluidity (प्रवाहिता) प्राप्त होते. तसेच द्रवांचा आकार ठराविक न राहता container (धारकपात्राप्रमाणे) change (बदलतो), परंतु gases (वायूंमध्ये) intermolecular force (आंतररेण्वीय बल) very weak (अति क्षीण) असते. त्यामुळे वायूंचे constituent particles (घटक कण) move freely (मुक्तपणे हालचाल) करू शकतात व उपलब्ध असलेली सर्व जागा occupy (व्यापून) टाकतात. त्यामुळे वायूंना definite shape (ठराविक आकार) किंवा definite volume (ठराविक आकारमान) हे दोन्ही नसतात.

Physical state of matter - Solid, liquid and gas



Q.1 Give Characteristics of

i) Solids ii) Liquid iii) Gases

Ans:

i) Characteristics of Solids -

- a) Fluidity/ Rigidity/ Plasticity / Elasticity - Rigid/ Plastic/ Elastic
- b) Volume - Definite
- c) Shapes - Definite
- d) Compressibility - Negligible
- e) Intermolecular force - Strong
- f) Distance between particles - Minimum

ii) Characteristics of Liquids -

- a) Fluidity/ Rigidity/ Plasticity / Elasticity - Fluid
- b) Volume - Definite
- c) Shapes - Indefinite
- d) Compressibility - very small

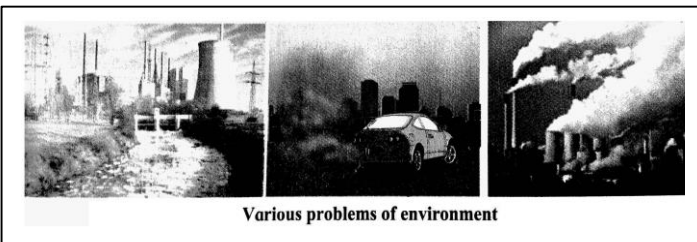
TOPIC - 08 POLLUTION

Pollution (प्रदूषण)

Q.1 What is Pollution?

Ans: Pollution: Contamination of natural environment that will be harmful to ecosystems is called as pollution.

Pollution (प्रदूषण): natural environment (नैसर्गिक पर्यावरणाचे) ecosystems (परिसंस्थेला) harmful (हानिकारक) असे contamination (दूषितीकरण) म्हणजे pollution (प्रदूषण) होय.



Various problems of environment

Q.2 What are Pollutants?

Ans: Pollutants:

- Factors affecting natural functions of ecosystem and causing harmful effects on abiotic and biotic factors are called as pollutants.
- Pollutants make the environment poisonous and unhealthy.
- Pollutants may be natural or manmade. Natural pollutants are destroyed in due course of time by nature's rule; however, manmade pollutants are not.

Pollutants (प्रदूषके):

Ecosystem (परिसंस्था) च्या natural functions (नैसर्गिक कार्य) मध्ये affecting (अडथळा) आणणाऱ्या, abiotic and biotic factors (अजैविक व जैविक घटकांवर) (वनस्पती, प्राणी आणि मानवावर) harmful effects (घातक परिणाम) घडवणाऱ्या घटकांना pollutants (प्रदूषके) म्हणतात. प्रदूषके environment (पर्यावरण) जास्त प्रमाणात मध्ये सोडली गेल्यास पर्यावरण poisonous (विषारी) व unhealthy (अनारोग्यकारक) होते. प्रदूषके natural (नैसर्गिक) तसेच manmade (मानवनिर्मित) असतात. Natural pollutants (नैसर्गिक प्रदूषके) nature's rule (निसर्ग नियम) नुसार कालांतराने destroyed

(नष्ट) होतात, याउलट manmade pollutants (मानवनिर्मित प्रदूषके) destroy (नष्ट) होत नाहीत.

Q.3 Define Air pollution

Ans: Air pollution:

Contamination of air by harmful substances like poisonous gases, smoke, particulate matter, microbes, etc. is called as air pollution.

Poisonous gases (विषारी वायू), smoke (धूर), particulate matter (धूलिकण), microbes (सूक्ष्मजीव) यांसारख्या harmful substances (घातक पदार्थांमुळे) contamination of air (हवा दूषित) होण्यास air pollution (हवेचे प्रदूषण) म्हणतात.

Q.4 What are the Natural Reasons of air pollution?

Ans: Reasons of air pollution:

Natural reasons:

- Volcanic eruption:** Solid, gaseous and liquid materials emerge out through eruption. Ex. Hydrogen sulphide, sulphur dioxide, carbon dioxide, ammonium chloride, hydrogen, vapors, dust, etc.
- Earthquake:** Poisonous gases and water vapors from inside of earth are released into air.
- Cyclones and dust storms:** Dust, soil, garbage, pollens, microbes are mixed with air.
- Forest fires:** Forest fires release carbon dioxide, sulphur dioxide, hydrogen sulfide, and smoke in environment.
- Microbes in air:** spores of bacteria, fungi are mixed with air.

Reasons of air pollution (हवा प्रदूषणाची कारणे):

Natural reasons (नैसर्गिक कारणे):

- Volcanic eruption (ज्वालामुखीचा उद्रेक):** eruption (उद्रेकातून) Solid (घनरूप), gaseous (वायुरूप) व liquid (द्रवरूप) materials (पदार्थ) बाहेर पडतात. उदा. Hydrogen sulphide (हायड्रोजन सल्फाईड), sulphur dioxide (सल्फर डायऑक्साईड), carbon dioxide (कार्बन डायऑक्साईड), ammonium chloride (अमोनियम क्लोराईड), hydrogen (हायड्रोजन), vapors (बाष्प), dust (धूलिकण).

ii) Earthquake (भूकंप): भूकंपामुळे inside of earth (पृथ्वीच्या अंतर्गत भागातील) poisonous gases (विषारी वायू) व water vapors (पाण्याची वाफ) हवेत released (मिसळली) जाते.

iii) Cyclones and dust storms (वावटळी व धुळीची वादळे): जमिनीवरील Dust (धूळ), garbage (केरकचरा), soil (माती), pollens (परागकण) व microbes (सूक्ष्मजीव) हवेत released (मिसळतात).

iv) Forest fires (वणवे): वणव्यामुळे carbon dioxide (कार्बन डायऑक्साइड), sulphur dioxide (सल्फर डायऑक्साइड), hydrogen sulfide (हायड्रोजन सल्फाइड) व smoke (धूर) environment (वातावरणात) मिसळतो.

v) Microbes in air (सूक्ष्मजीव हवेत मिसळल्यामुळे): उदा. Bacteria (काही जीवाणू), fungi (कवकांचे) spores (बिजाणू) हवेत मिसळतात.

Solid waste (घन कचरा), agricultural waste (शेतीचा कचरा), open space (उघड्यावर) burning (जाळल्यामुळे) हवा pollution (प्रदूषण) होते.

2) Industrialization (औद्योगिकीकरण): various factories (विविध कारखान्यातून) large quantity (प्रचंड प्रमाणात) smoke (धूर) बाहेर पडतो. sulphur powder (गंधकाची भस्मे) nitrogen oxide (नायट्रोजन ऑक्साइड), वातावरणात released (मिसळतात).

3) Atomic energy plants and blasts (अणुऊर्जा निर्मिती व अणुस्फोट): अणुऊर्जा निर्मितीत uranium (युरेनियम), thorium (थोरियम), graphite (ग्रेफाइट), plutonium (प्लुटोनियम) या elements (मूलद्रव्यांच्या) वापरामुळे radiations (किरणोत्सर्जन) होऊन air pollution (हवा प्रदूषण) occurs (घडून येते).

Q.5 What are the Manmade Reasons of air pollution?

Ans: Manmade reasons:

1) Fuel:

i) Burning of fuel like coal, timber, LPG, kerosene, diesel, petrol releases carbon dioxide, carbon monoxide, nitrogen oxide, sulphur dioxide, lead compounds, etc. are released in air.

ii) Burning of solid waste, agricultural waste, etc. in open space causes air pollution.

2) Industrialization:

i) Smoke is released in large quantity from various factories.

ii) Sulphur powder, nitrogen oxide, Cotton seed powder in air.

3) Atomic energy plants and blasts:

Use of elements like uranium, thorium, graphite, plutonium release radiations in air and thus pollution occurs.

Manmade reasons (मानवनिर्मित कारणे):

1) Fuel (इंधनाचा वापर):

coal (दगडी कोळसा), timber (लाकूड), LPG (एलपीजी), kerosene (रॉकेल), diesel (डीझेल), petrol (पेट्रोल) यांच्या वापरामुळे carbon dioxide (कार्बन डायऑक्साइड), carbon monoxide (कार्बन मोनाक्साइड), nitrogen oxide (नायट्रोजन ऑक्साइड), sulphur dioxide (सल्फर डायऑक्साइड), lead compounds (शिशाची संयुगे) हवेत मिसळतात.

Sr. No	Air Pollutants	Source	Effects
1)	Sulphur dioxide (SO ₂)	Factories (where coal and mineral oil used as fuel)	Irritation of eyes, respiratory tract, excess mucus, cough, breath.
2)	Carbon monoxide (CO)	Vehicular and industrial smoke	Lowered O ₂ carrying capacity of blood.
3)	Oxides of nitrogen	Vehicular smoke	Irritation of respiratory tract and lungs
4)	Particulate matter	Vehicular and industrial smoke	Respiratory diseases
5)	Dust	Vehicular and industrial smoke	Silicosis
6)	Pesticides	Production and use of pesticides	Mental weakness, death due to prolonged exposure
7)	Methane (CH ₄)	Industrial leakage	Poisoning, skin cancer, asthma, respiratory diseases.

क्र .	हवा प्रदूषके	स्त्रोत	परिणाम
1)	सल्फर डाय ऑक्साईड (SO ₂)	factories (कारखाने) (ज्या ठिकाणी कोळसा व mineral oil (खनिज तेल) - fuel इंधनाचा वापर)	डोळ्यांचा irritation (दाह), respiratory tract(श्वसनमार्गाचा) दाह, excess cough (अतिरिक्त कफ निर्मिती), खोकला दम लागणे
2)	कार्बन मोनाक्साईड (CO)	Vehicular (वाहन) आणि industrial (कारखान्यांचा) smoke (धूर)	Blood (रक्ताच्या) ऑक्सिजन carrying capacity (धारणक्षमतेत) lowered (घट)
3)	नायट्रोजनची ऑक्साईडे	Vehicular smoke (वाहनांचा धूर)	Lungs (फुफ्फुसे) व respiratory tract (श्वसन मार्गाचा) irritation (दाह)
4)	Particulate matter (हवेत मिसळलेले कणरूप पदार्थ)	industrial (उद्योग) व वाहनांचा धूर	Respiratory diseases (श्वसनरोग)
5)	Dust (धूळ)	उद्योग व वाहनांचा धूर	सिलिकॉसिस व्याधी
6)	Pesticides (कीटनाशके)	कीटनाशकांची production (निर्मिती) व use (वापर)	Mental weakness (मनोदौर्बल्य), prolonged exposure (दीर्घश्वसनामुळे) death (मृत्यू)
7)	मिथेन (CH ₄)	Industrial leakage (कारखान्यांतून होणारी वायुगळती)	Poisoning (विषबाधा), skin cancer (त्वचेचा कर्करोग), asthma(दमा), respiratory diseases (श्वसनसंस्थेचे विकार)

Q.6 What are the Effect of air pollution on plants and animals?

Ans: Effect of air pollution on plants and animals:

Plants:

- Stomata get closed.
- Slowing down of rate of photosynthesis.
- Growth is retarded. Leaves fall off or become yellow.

Animals:

- Respiration is adversely affected.
- Irritation of eyes

Effect of air pollution on plants and animals (हवा प्रदूषणाचा वनस्पती व प्राणी यांच्यावर होणारा परिणाम) -

Plants (वनस्पती) -

- Stomata (पर्णछिद्रे) closed (बुजून) जातात.
- Photosynthesis (प्रकाश संश्लेषणाची) क्रिया slow (मंदावते).
- वनस्पतीची growth (वाढ) retarded (खुंटते). पाने गळतात, पिवळी पडतात.

Animals (प्राणी) -

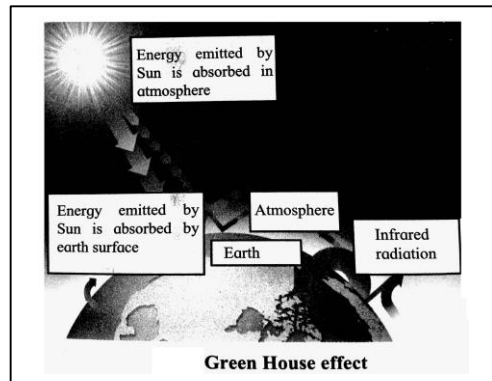
- श्वसनावर adversely affected (विपरीत परिणाम) होतो.
- Irritation of eyes (डोळ्यांचा दाह)

Q.7 Write in detail the Effect of air pollution on atmosphere.

Ans: Effect of air pollution on atmosphere:

A) Depletion in Ozone layer:

- Earlier, we have studied that ozone layer is present below the stratosphere, at the height of 48 kilometres from earth's surface.
- It protects the living world of the earth from ultraviolet rays (UV-B) radiating from the Sun. However, nowadays, ozone layer is getting depleted due to following reasons.

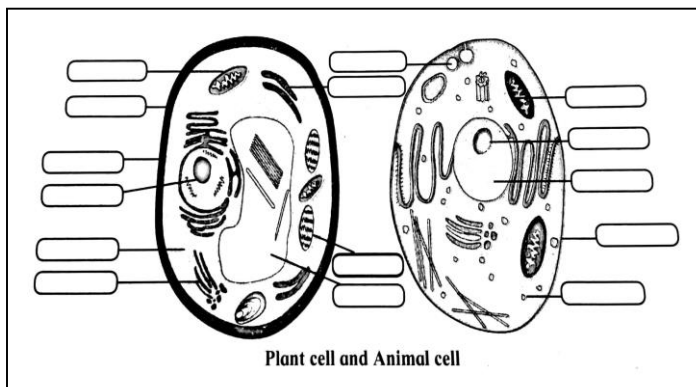


TOPIC - 10

CELL AND CELL ORGANELLES

Cell and Cell Organelles (पेशी व पेशीअंगके)

Q.1 Observe the following figures, write the names and complete the chart.



Ans:

Component	Animal cell	Plant cell
Cell membrane	Present	Present
Cell wall	<u>Absent</u>	<u>Present</u>
<u>Lysosomes</u>	Present	Absent
Plastids	<u>Absent</u>	<u>Present</u>
<u>Endoplasmic reticulum</u>	Present	Present
Vacuole	<u>Present</u>	<u>Present</u>
Golgi complex	<u>Present</u>	<u>Present</u>
Mitochondria	<u>Present</u>	<u>Present</u>

Q.2 Explain in detail the Components of a cell.

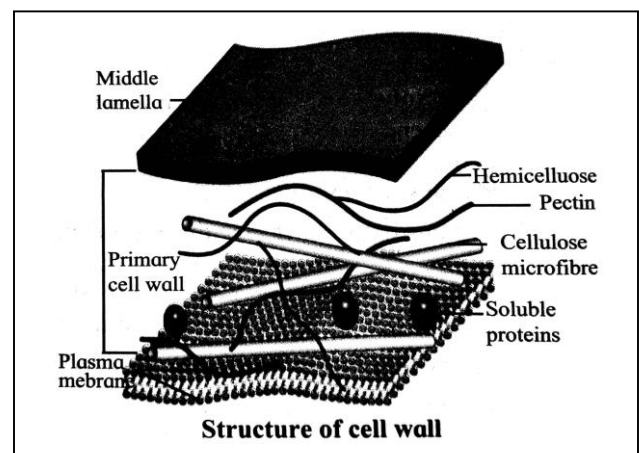
Ans: Components of a cell:

1) Cell wall:

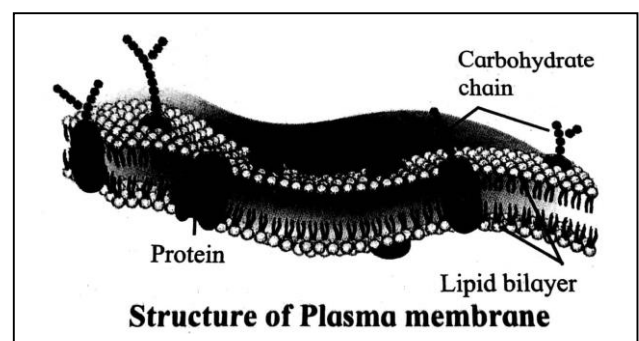
- It is found around cells of algae, fungi and plants. Animal cells lack cell wall.
- Cell wall is an elastic and strong coat around cell membrane.
- It is mainly composed of carbohydrates like cellulose and pectin. Afterwards, polymers like lignin, suberin, cutin are added in cell wall as per need.
- Functions of cell wall are to support and to protect the cell by preventing entry of excess water in the cell.

Parts of Cell (पेशीचे भाग) -

1) Cell wall (पेशीभित्तिका): Algae (शैवाल), fungi (कवक) व वनस्पतीपेशी भोवती आढळते; animal cells (प्राणीपेशीला) cell wall (पेशीभित्तिका) नसते. पेशीभित्तिका म्हणजे cell membrane (पेशीपटलाभोवती) असणारे strong (मजबूत) व elastic (लवचिक) coat (आवरण). पेशीभित्तिका मूलतः cellulose (सेल्युलोज) व pectin (पेक्टिन) ह्या carbohydrates (कबोदकांपासून) बनलेली असते. Afterwards (कालांतराने) need (आवश्यकतेनुसार) lignin (लिग्निन), suberin (सुबेरिन), cutin (क्युटिन) अशी polymers (बहुवारिके) cell wall (पेशीभित्तिकेत) तयार होतात. Cell (पेशीला) support (आधार) देणे, पेशीत जाणाऱ्या excess water (अतिरिक्त पाण्याला) preventing (अडवून) पेशीचे protect (रक्षण) करणे ही cell wall (पेशीभित्तिकेची) functions (कार्ये) आहेत.



2) Plasma membrane/cell membrane:



- It is a thin, fragile and elastic covering that separates the cell components from outer environment.
- Structure of plasma membrane Protein molecules are embedded in two layers of phospholipids.
- Plasma membrane is said to be a selectively permeable membrane as it allows some substances to enter the cell, while prevents other substances.

- iv) Due to this property, useful molecules of water, salt and oxygen enter the cell and CO_2 exits the cell.
- v) If any changes occur outside the cell, the cellular environment does not change due to plasma membrane. This condition is called homeostasis.

2) Plasma membrane/cell membrane (प्रद्रव्यपटल पेशीपटल): हे पेशीभोवती असणारे thin (पातळ), fragile (नाजूक) व elastic (लवचिक) covering (आवरण) असून पेशीतील components (घटकांना) outer environment (बाह्य पर्यावरणापासून) separates (वेगळे) ठेवते.

Phospholipids (स्फुरिल मेदाच्या) दोन layers (थरांमध्ये) embedded (मिसळलेले) protein molecules (प्रथिनांचे रेणू) - अशी plasma membrane (प्रद्रव्यपटलाची) structure (रचना) असते.

Plasma membrane (प्रद्रव्यपटल) काही ठराविक substances (पदार्थांना) to enter (ये-जा) करू देते, तर काही पदार्थांना prevents (अटकाव) करते; म्हणून त्याला selectively permeable membrane (निवडक्षम पारपटल) म्हणतात. या property (गुणधर्मामुळे) water (पाणी), salt (क्षार), oxygen (ऑक्सिजन) असे useful (उपयुक्त) molecule (रेणू) पेशीत enter (प्रवेश) करतात. तर कार्बनडाय ऑक्साइडसारखे टाकाऊ पदार्थ exits the cells (पेशीबाहेर पडतात). पेशीबाहेर काही changes (बदल) झाले तरी cellular environment (पेशीतील पर्यावरण) पटल कायम राखण्याचे काम plasma membrane (प्रद्रव्यपटल) करते; यास homeostasis (समस्थिती) म्हणतात.

Q.3 Define Endocytosis and Exocytosis.

Ans: Activities that consume cellular energy:

- i) **Endocytosis:** To gulp/engulf food and other substance's from outer environment.
- ii) **Exocytosis:** To excrete waste materials out of cell.

Activities that consume cellular energy (पेशीची ऊर्जा वापरून चालणाऱ्या क्रिया) -

i) **Endocytosis (पेशीय भक्षण):**

बाहेरील पर्यावरणातून food (अन्न) व other substances (इतर पदार्थ) gulp/ engulf (गिळंकृत करणे).

ii) **Exocytosis (पेशी उत्सर्जन):**

Waste materials (टाकाऊ पदार्थ) पेशीबाहेर to excrete (टाकणे).

Q.4 Explain in detail the Process that don't consume cellular energy.

Ans: Processes those that don't consume cellular energy:

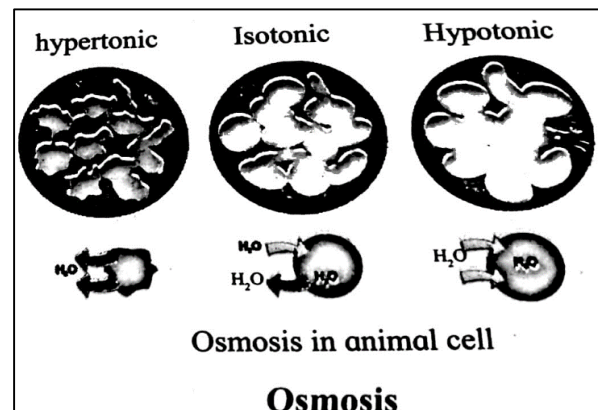
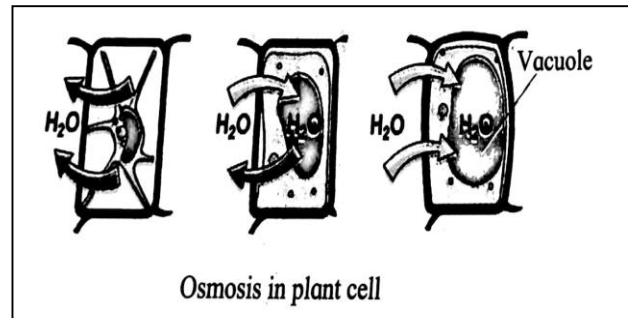
i) **Diffusion:** Entry or exit of small molecules like O_2 , CO_2 .

ii) **Osmosis:** The travelling of water from a part with more water to a part with less water, through a selectively permeable membrane is osmosis. It is a physical process with 3 possibilities.

Cellular energy (पेशीची ऊर्जा) न consume (वापरता) चालणाऱ्या processes (क्रिया) -

i) **Diffusion (विसरण):** O_2 , CO_2 सारखे small molecules (लहान रेणू) पेशीमध्ये entry (घेणे) /पेशीबाहेर exit (जाणे).

ii) **Osmosis (परासरण):** जास्त पाणी असलेल्या भागाकडून less water (कमी पाणी) असलेल्या part (भागाकडे) selectively permeable membrane (निवडक्षम पारपटलातून) होणारा पाण्याचा travelling (प्रवास) म्हणजे osmosis (परासरण). ही physical process (भौतिक क्रिया) असून ती घडण्याच्या ३ वेगवेगळ्या possibilities (शक्यता) असतात.



a) **Isotonic solution:** Medium outside and inside the cell has same proportion of water, water doesn't go in or out.

b) **Hypotonic solution:** The cell has less water than outside medium, so water enters the cell. This is called

Q.16 Explain the differences.**A) External and internal respiration:**

External respiration	Internal respiration
i) Intake of air from the outside into the body and release of air from the body to outside is called external respiration.	i) Exchange of gases between cells and tissue fluid is called internal respiration.
ii) External respiration occurs between cells and the external environment.	ii) Internal respiration occurs only in the cells of the body.
iii) It involves processes of inspiration and expiration.	iii) It involves movement of O ₂ from blood into tissue fluid and movement of CO ₂ from tissue.
iv) External respiration involves breathing and gaseous exchange.	iv) Internal respiration involves neither breathing nor gaseous exchange.
v) Oxygen combines with haemoglobin in external respiration.	v) Chemical reactions occur in the cells to form energy.

A) External (बहिःश्वसन) and internal respiration (अंतःश्वसन):

बहिःश्वसन	अंतःश्वसन
i) बाहेरून शरीरात हवा घेणे आणि शरीरातून बाहेर हवा सोडणे या प्रक्रियांना एकत्रितपणे बहिःश्वसन असे म्हणतात.	i) रक्त आणि ऊर्ती किंवा पेशी यांच्यातील वायूंची देवाणघेवाण या प्रक्रियेला अंतःश्वसन असे म्हणतात.
ii) बहिःश्वसन हे पेशी आणि बाह्य वातावरणात यांच्यामध्ये होते.	ii) अंतःश्वसन हे केवळ शरीरातील पेशींमध्ये होते.
iii) बहिःश्वसनात श्वास आणि उच्छ्वास यांचा समावेश होतो.	iii) अंतःश्वसनात ऑक्सिजनचे वहन रक्तातून पेशीत किंवा ऊर्तीमध्ये आणि ऊर्तीपासून कार्बन डायऑक्साइडचे वहन रक्तात होते.

iv) बहिःश्वसनात श्वासोच्छ्वास आणि वायूंची देवाणघेवाण होते.	iv) अंतःश्वसनात श्वासोच्छ्वास किंवा वायूंची देवाणघेवाण होत नाही.
v) बहिःश्वसनात ऑक्सिजनचा हिमोग्लोबिनशी संयोग होतो.	v) अंतःश्वसनात पेशींमध्ये रासायनिक प्रक्रिया होऊन ऊर्जा निर्मिती होते.

B) Arteries and veins:

Arteries	Veins
i) Arteries carry blood away from the heart to the tissues of the body.	i) Veins carry blood from the tissues of the body back to the heart.
ii) Arteries are located deeper within the body.	ii) Veins are usually located superficially beneath the surface of the skin.
iii) Arteries are thick walled.	iii) Veins are thin walled.
iv) Arteries do not have valves.	iv) Veins have valves.
v) Arteries would generally remain open if blood flow stopped, due to their thick muscular layer.	v) Veins would collapse if blood flow stops.
vi) Except pulmonary artery, all arteries carry oxygenated blood.	vi) Except pulmonary vein, all veins carry deoxygenated blood.
vii) Arteries are more muscular than veins, which helps in transporting blood that is full of oxygen efficiently to the tissues.	vii) Veins are less muscular than arteries, but contain valves to help keep blood flowing in the right direction, usually toward the heart.
viii) There is maximum blood pressure in the arteries.	viii) There is minimum blood pressure in the veins.

Q.17 Explain with reasons.**1) Human blood is red coloured.**

Reflection of reflected light

Reflection of reflected light (परावर्तित प्रकाशाचे परावर्तन)

1) How do you see if the barber in a saloon has cut the hair on your neck properly or not?

Ans: In saloon, there are mirrors in your front and at back. The image of the back of your head is formed in the mirror at the back. The image of this image is formed in the mirror in front of you. Thus you can see how the hair at the back side of your head is cut.

2) How do we see the image of the moon in water?

Ans: As moon is not self-luminous, the sun light falling on the surface of the moon is reflected. This reflected light is again reflected by water to give us the image of the moon. In this way light can be reflected several times.

1) Saloon (केशकर्तनालय) मध्ये तुमच्या neck (मान) वरचे केश barber (कारागिर) ने व्यवस्थित cut (कापले) आहेत का हे तुम्ही कसे पाहता?

केशकर्तनालयात तुमच्या back (मागे) आणि front (पुढे) आरसा असतो. तुमच्या पाठीमागील भागाची प्रतिमा मागील आरशात निर्माण होते. प्रतिमेची image (प्रतिमा) पुढील mirror (आरशा) मध्ये दिसते. त्यामुळे केशकर्तनालयात मानेवरील hair (केश) व्यवस्थित कापले आहेत का ते तुम्हांला पाहता येते.

2) आपण moon (चंद्रा) चे पाण्यातील प्रतिबिंब कशाप्रकारे पाहतो?

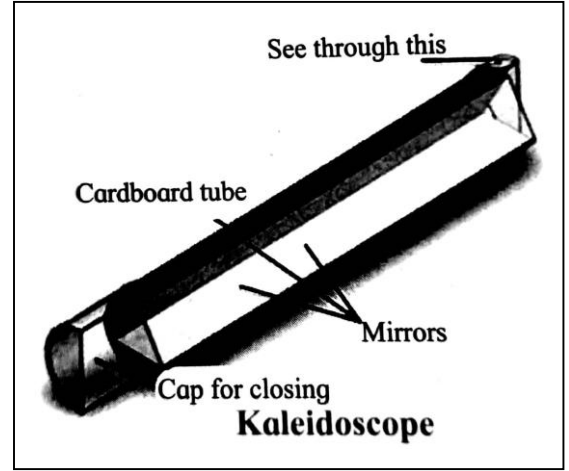
चंद्र self-luminous (स्वयंप्रकाशित) नसल्याने सूर्याचा प्रकाश चंद्रावर पडून त्याचे reflection (परावर्तन) होते. त्यानंतर पाण्यातून परावर्तित प्रकाशाचे पुन्हा परावर्तन होते व आपल्याला चंद्राचे प्रतिबिंब दिसते. याच पद्धतीने परावर्तित light (प्रकाशा) चे अनेक वेळा परावर्तन होऊ शकते.

Kaleidoscope:

Kaleidoscope (कॅलिडोस्कोप (शोभादर्शी / चारूदर्शी) -

You can see different designs in the Kaleidoscope. The specialty of a Kaleidoscope is that the designs do not easily repeat themselves. Every time the design is different. People making wall papers which are used to

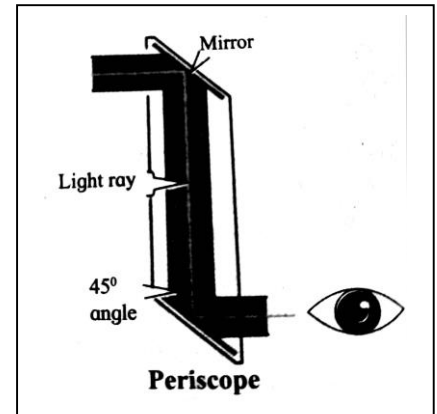
decorate walls and cloth designers use Kaleidoscope for making new designs.



तुम्ही कॅलिडोस्कोप पाहिल्यास वेगवेगळ्या designs (रचना) तयार झालेल्या पाहायला मिळतील. कॅलिडोस्कोपचे खास वैशिष्ट्य म्हणजे यामध्ये एकदा तयार झालेली रचना पुन्हा सहजपणे तयार होत नाही. प्रत्येक वेळी दिसणारी रचना ही वेगवेगळी असते. खोलीच्या wall (भिंती) decorate (सुशोभित) करण्यासाठी वापरला जाणारा नक्षीदार कागद तयार करणारे व वस्त्रोद्योग व्यवसायामधील designers (अभिकल्पक) कॅलिडोस्कोपचा उपयोग वेगवेगळ्या रचना शोधण्यासाठी करतात.

Periscope:

Periscope (परिदर्शी) -



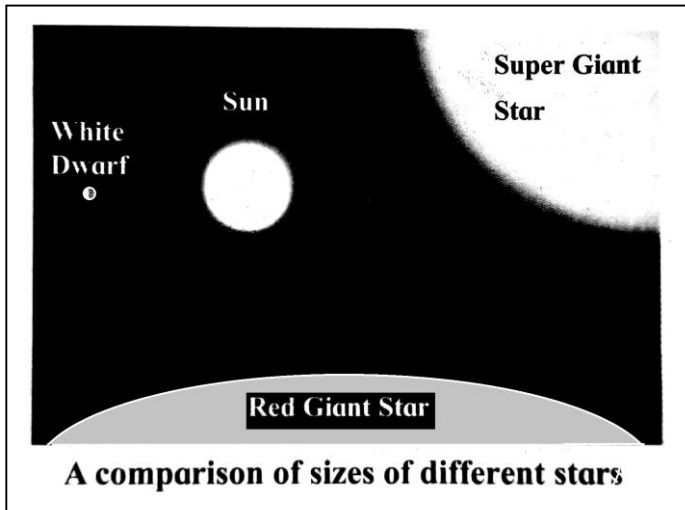
- From the bottom window, one can see what is in front of the top window. This device is called a periscope.
- This is used in submarines to see objects above the surface of water.

19.6 Evolution of stars based on their mass and their end stages

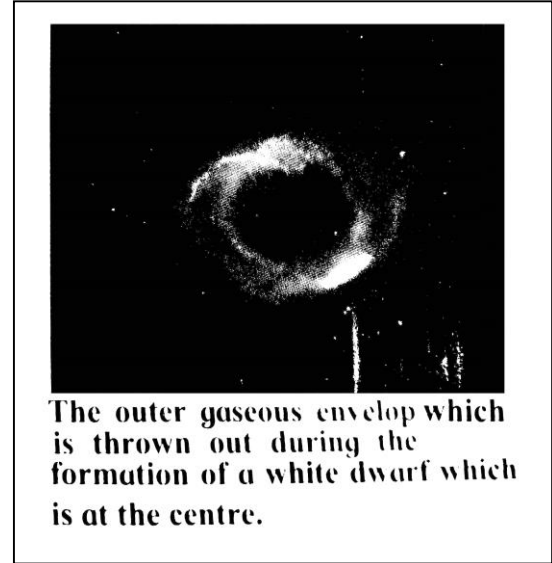
Q.6 Write a short note on End stages of stars having initial mass less than 8 time the mass of the Sun ($M_{\text{star}} < 8 M_{\text{Sun}}$).

Ans: End stages of stars having initial mass less than 8 time the mass of the Sun ($M_{\text{star}} < 8 M_{\text{Sun}}$) :

- Stars in this group undergo huge expansion and their radius increases by a factor of 100 to 200. In this stage they are called red giant stars.
- This name is given because of the large size and because of the fact that the stars look reddish due to their lower temperature.
- The size of a red giant star in comparison to other types of stars is shown in figure.



- At the end of its evolution, these stars explode and their outer gas envelope is thrown out.
- The inner part contracts and its size becomes similar to the size of the earth.
- As the mass of the star is much higher than that of the earth and the size is similar to that of the earth, the density in the star becomes very high.
- In this state, the pressure due to the electrons in the star becomes independent of temperature and is able to balance the gravitational force forever.
- In this state, the star looks white and due to its small size it is called a white dwarf.
- After this its temperature keeps decreasing but its size and mass remain unchanged for ever and so white dwarf is the end stage of stars in this mass range.



सूर्याच्या वस्तुमानाच्या 8 पटीहून कमी initial mass (मूळ वस्तुमान) असलेल्या ताऱ्यांची ($M_{\text{star}} < 8 M_{\text{sun}}$) end stages (अंतिम अवस्था): या ताऱ्यांच्या evolution (उत्क्रांती) दरम्यान त्यांचे huge expansion (मोठ्या प्रमाणात प्रसरण) होते व त्यांचा आकार 100 ते 200 पटीने increases (वाढतो). या अवस्थेत त्यांना red giant stars (तांबडा राक्षसी तारा) म्हणतात. हे नाव त्यांच्या large size (मोठ्या आकारामुळे) व त्यांचे temperature (तापमान) lower (कमी झाल्याने) ते लालसर दिसत असल्याने दिले गेले आहे. इतर प्रकारच्या ताऱ्यांच्या comparison (सापेक्ष) तांबड्या राक्षसी ताऱ्याचा आकार आकृती मध्ये दाखविला आहे. End of evolution (उत्क्रांतीच्या शेवटी) या ताऱ्यांचा explode (विस्फोट) होतो. ताऱ्यांचे outer gas (बाहेरील वायूचे) envelope (आवरण) दूर thrown out (फेकले जाते) व inner part (आतील भाग) contracts (आकुंचित) होतो. या आतील भागाचा आकार साधारणपणे पृथ्वीच्या आकाराइतका होतो. ताऱ्यांचे mass (वस्तुमान) पृथ्वीपेक्षा खूप अधिक असल्याने व size (आकार) earth (पृथ्वीइतका) झाल्याने ताऱ्यांची density (घनता) खूप वाढते. अशा स्थितीत त्यांतील इलेक्ट्रॉनमुळे निर्माण झालेला pressure (दाब) temperature (तापमानावर) independent (अवलंबून असत नाही) व तो ताऱ्यांच्या gravitational force (गुरुत्वीय बलास) for ever (अनंतकाळापर्यंत) balance (संतुलित) करण्यास पुरेसा असतो. या state (अवस्थेत) तारे white (श्वेत) दिसतात व त्यांच्या small size (लहान आकारामुळे) ते White dwarfs (श्वेत बटू) म्हणून ओळखले जातात. यानंतर त्यांचे तापमान कमी होत जाते परंतु size (आकार) व mass (वस्तुमान) अनंतकाळापर्यंत unchanged (स्थिर) राहतात म्हणून ही white dwarf (बटू अवस्था) या ताऱ्यांची end stage (अंतिम अवस्था) असते.

अशाच प्रकारे ...

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