

Absorption by roots

1. Root hairs become flaccid and droop when excess fertilisers are added to the moist soil around them. .Give suitable biological reasons

(2019)

Answer:

Excessive fertilisers make the soil hypertonic as compared to root hair cells. Exosmosis takes place from the root hair cell to the soil and root hair cells become flaccid due to which they droop.

2. Correct the following statement by changing the underlined word : The cell sap of root hair is Hypotonic.

(2018)

Answer:

Hypertonic

3. Correct the following statement by changing the underlined word : Xylem transports starch from the leaves to all parts of the plant body.

(2018)

Answer:

Phloem

4. The process by which root hairs absorb water from the soil.

(2017)

Answer:

Osmosis

5. Marine fish when placed in tap water bursts because of:

- A. Endosmosis
- B. Exosmosis
- C. Diffusion
- D. Plasmolysis

(2017)

Answer:

A. Endosmosis

6. The statements given below are incorrect. Rewrite the correct statement by changing the underlined word of the statement: Free movement of solutes in and out of the cell takes place across the cell membrane.

(2017)

Answer:

Free movement of solute in and out of the cell takes place across the cell wall.

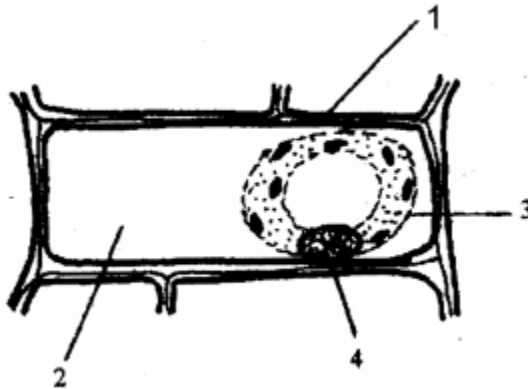
7. Give an appropriate biological term : Movement of molecules of a substance from their higher concentration to lower concentration when they are in direct contact.

(2018)

Answer:

Diffusion

8. The diagram given below represents a plant cell after being placed in a strong sugar solution. Study the diagram and answer the questions that follow: [5]



- (i) What is the state of the cell shown in the diagram?
(ii) Name the structure that acts as a selectively permeable membrane.
(iii) Label the parts numbered 1 to 4 in the diagram.
(iv) How can the above cell be brought back to its original condition? Mention the scientific term for the recovery of the cell.
(v) State any two features of the above plant cell which are not present in animal cells.

(2017)

Answer:

(i) The cell is Plasmolysed.

(ii) Cell membrane.

(iii)

1. Cell wall
2. Strong sugar solution
3. Cell membrane
4. Nucleus.

(iv) By placing it in a hypotonic solution/water.

The scientific term for the recovery of the cell from this state is deplasmolysis.

(v) (i) Cell wall

(ii) Vacuole.

9. Name the process of uptake of mineral ions against the concentration gradient using energy from the cell.

(2015)

Answer:

Active absorption

10. Explain Turgor Pressure

(2015)

Answer:

Turgor pressure is the pressure exerted by the protoplasm of a cell onto the cell wall when the cell is turgid.

11. Give biological explanation : Plants growing in fertilised soil are often found to wilt if the soil is not adequately watered.

(2018)

Answer:

Water makes the roots and all parts of plants turgid and their deficiency may lead to wilting of these parts. Moreover, fertilised soil acts as a hypertonic solution which results in exosmosis from the root cells to the surrounding soil. This deprives the capillary tubes off of their water content making the plants growing in fertilised soil to wilt if not adequately watered.

12. Choose the correct answer from the four options : A plant cell may burst when :

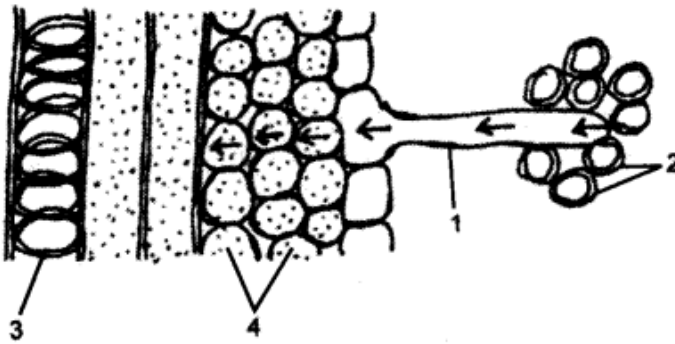
- (A) Turgor pressure equalised wall pressure.
- (B) Turgor pressure exceeds wall pressure.
- (C) Wall pressure exceeds turgor pressure.
- (D) None of the above

(2016)

Answer:

- (B) Turgor pressure exceeds wall pressure.

13. The figure given below is a diagrammatic representation of a part of the cross section of the root in the root hair zone. Study the same and then answer the questions that follow :



- (i) Name the parts indicated by the guidelines 1 to 4.
- (ii) Which is the process that enables the passage of water from the soil into the root hair ?
- (iii) Name the pressure that is responsible for the movement of water in the direction indicated by the arrows. Define it.
- (iv) Due to an excess of this pressure sometimes drops of water are found along the leaf margins of some plants especially in the early mornings. What is the phenomenon called ?
- (v) Draw a well labelled diagram of the root hair cell as it would appear if an excess of fertiliser is added to the soil close to it.

(2016)

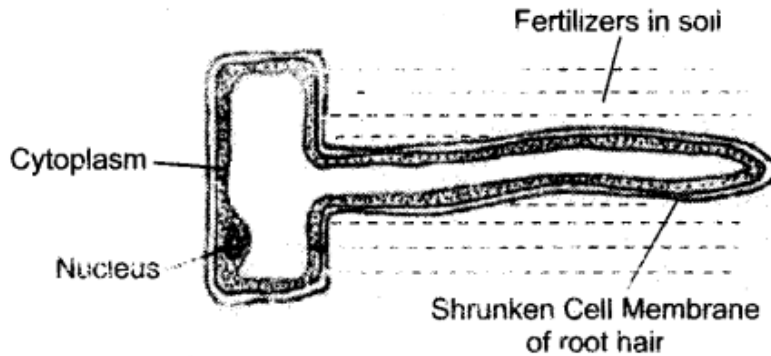
Answer:

- (i) 1. Root hair 2. Soil water 3. Xylem Vessels 4. Cortical cells.
- (ii) Osmosis Process
- (iii) Osmotic pressure: The pressure exerted by a solution to prevent the entry of water molecules, through the semi-permeable membrane is called osmotic pressure. OR Osmotic pressure is the minimum pressure that is required to prevent the entry of any more water molecules into the root from the soil. OR

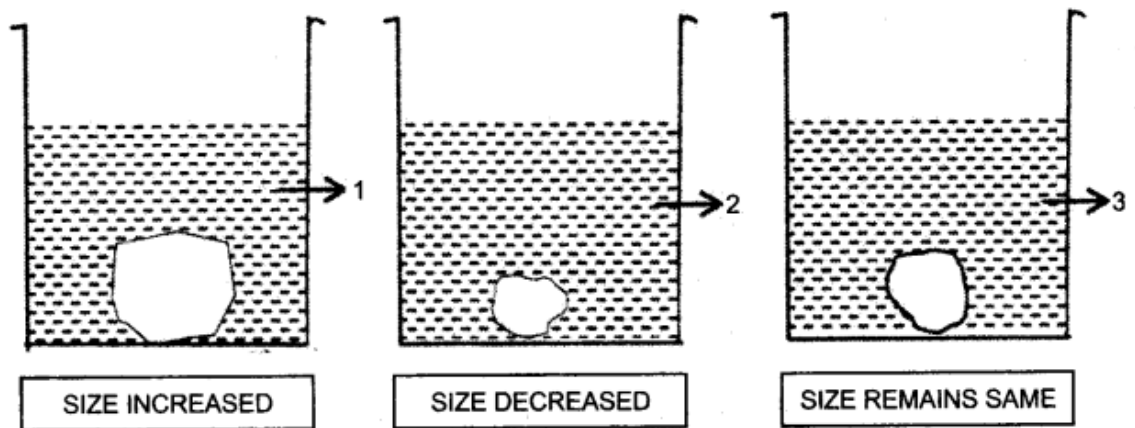
Osmotic pressure is the pressure exerted by the cells of the root to conduct water through the cortical cells upto the xylem vessels.

(iv) Guttation.

(v)



14. A candidate in order to study the process of osmosis has taken 3 potato cubes and put them in 3 different beakers containing 3 different solutions. After 24 hours, in the first beaker the potato cube increased in size, in the second beaker the potato cube decreased in size and in the third beaker there was no change in the size of the potato cube. The following diagram shows the result of the same experiment:



- (i) Give the technical terms of the solutions used in beakers, 1, 2, and 3.
 (ii) In beaker 3 the size of the potato cube remains the same. Explain the reason in brief.
 (iii) Write the specific feature of the cell sap of root hairs which helps in absorption of water.
 (iv) What is osmosis ?
 (v) How does a cell wall and a cell membrane differ in their permeability ? **[5]**

(2014)

Answer:

- (i) (1) Hypotonic solution.
- (2) Hypertonic solution.
- (3) Isotonic solution.
- (ii) In beaker 3, the concentration of the potato cube and the medium is the same. So there is no osmosis taking place therefore the size of the cube remains the same.
- (iii) The concentration of cell sap is higher in the root hair as compared to soil water due to which endosmosis takes place facilitating absorption of water.
- (iv) Osmosis is a process of flow of solvent molecules from a region of its higher concentration to a region of its lower concentration through a semipermeable membrane.
- (v) Cell wall is freely permeable and cell membrane is semi-permeable.

15. Give a biological term for the process of uptake of mineral ions against the concentration gradient using energy from the cell.

(2016)

Answer:

Active absorption

16. The phenomenon by which living or dead plant cells absorb water by surface attraction.

(2012)

Answer:

Imbibition

17. Rewrite the terms in the correct order so as to be in a logical sequence.
Endodermis, Cortex, Soil water, Xylem, Root hair.

(2013)

Answer:

Soil water, Root hair, Cortex, Endodermis, Xylem.

18. Give biological term : A solution in which the relative concentration of water molecules and the solute on either side of the cell membrane is the same.

(2013)

Answer:

Isotonic

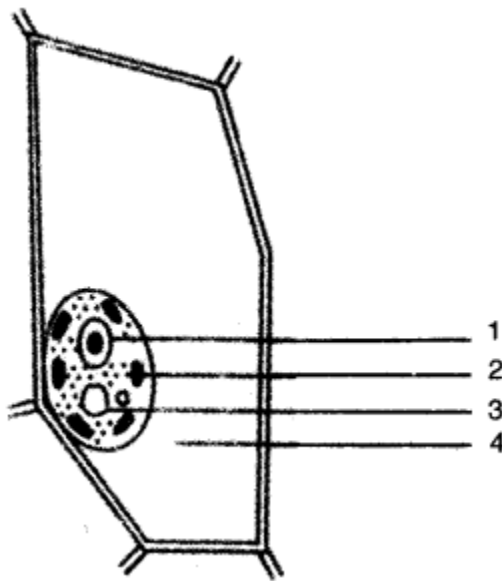
19. A membrane which allows the passage of molecules selectively.

(2012)

Answer:

Selectively permeable membrane

20. Given below is the diagram of a cell as seen under the microscope after having been placed in a solution:



(i) What is the technical term used for the state condition of the cell given above?

(ii) Give the technical term for the solution in which the cell was placed.

(iii) Name, the parts numbered 1 to 4.

(iv) Is the cell given above a plant cell or an animal cell ? Give two reasons in support of your answer as evident from the diagram.

(v) What would you do to bring this cell back to its original condition ? **[5]**

(2012)

Answer:

(i) The given cell is plasmolysed

(ii) Hypertonic solution

(iii) (1) Nucleus (2) Chloroplast (3) Vacuole (4) Hypertonic solution

(iv) Plant cell. Because

(1) Clear distinct cell wall is seen

(2) Chloroplast clearly seen in the cytoplasm.

(3) Centrosome not seen.

(4) A single prominent vacuole is visible.

(v) Place it on a hypotonic medium or plain water for some time.

21. Give biological reason :Wooden frames of doors get jammed during the monsoon season.

(2013)

Answer:

Wooden frames of doors and windows get jammed due to the process of imbibition. In this process, water is adsorbed or adsorbed by surface attraction. Wood has a strong affinity for water (hydrophilic). Thus, they absorb or imbibe water or moisture from their surroundings and swell up. This causes wooden frames of doors to get jammed during the monsoon season.

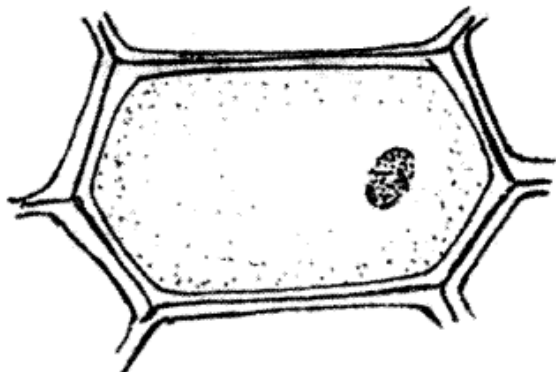
22. Briefly explain : Osmosis

(2012)

Answer:

Osmosis : The process of movement of solvent molecules from its region of high concentration to its region of low concentration through a semipermeable membrane.

23. The figure given below shows the epidermal cells of an onion bulb. This cell was then transferred to a drop of sugar solution.

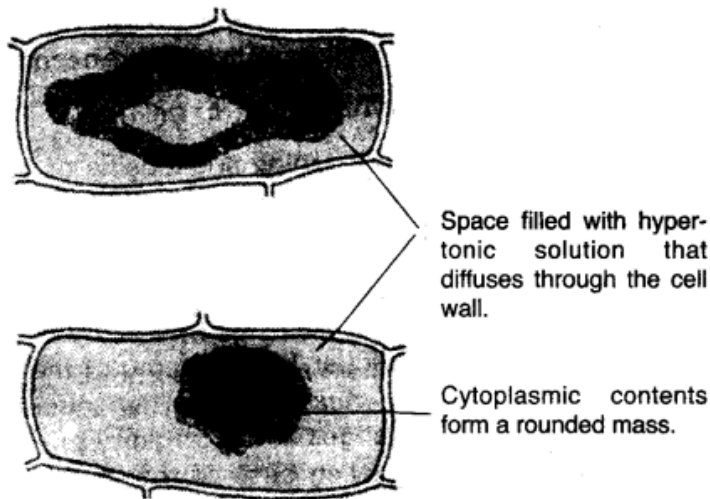


- (i) Draw a well labelled diagram of the epidermal cell as it would appear after immersion in a strong sugar solution.
- (ii) What scientific term is used for the changes as shown in (i) above ?
- (iii) What should be done to restore the cell back to its original condition ?
- (iv) Give the scientific term for the recovery of the cell as a result of the step taken in (iii) above.
- (v) Define the term osmosis.

(2013)

Answer:

(i)



- (ii) Plasmolysis is the scientific term used for the above change.
- (iii) To restore the cell back to its original condition, it must be placed in a hypotonic solution immediately after it gets plasmolysed.
- (iv) Deplasmolysis is a technical term used for recovery of the cell as a result of the step taken in (iii) above.
- (v) Osmosis: It is the movement of water molecules from the region of its higher concentration to the region of its lower concentration through a semipermeable membrane.

24. Wooden doors swell up in the rainy season due to

(2011)

Answer:

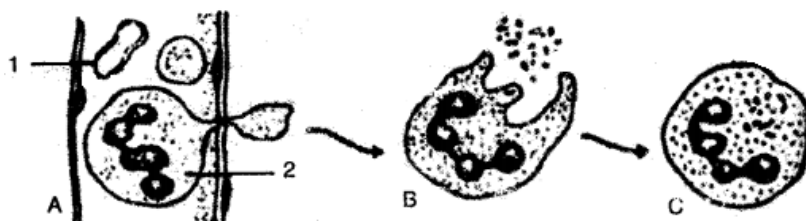
Imbibition

25. is the phenomenon of contraction of the cytoplasm from the cell wall.

(2011)

Answer:
Plasmolysis

26. Study the following diagram carefully and then answer the questions that follow:



- Name the cell labelled 1.
- Identify the phenomenon occurring in A.
- Mention two structural differences between 1 and 2.
- Name the process occurring in B and C and state the importance of this process in the human body. [5]

(2011)

Answer:

- 1 - Red blood cells.
- Diapedesis
-

1(RBC)	2 (WBC - neutrophil)
(a) Biconcave in shape (b) Nucleus absent	(a) Amoeboid in shape (b) Nucleus present

(iv) Phagocytosis Process. Phagocytosis is the process of engulfing any foreign material that has entered the body thereby defending the body from disease causing germs. This is done by WBCs.

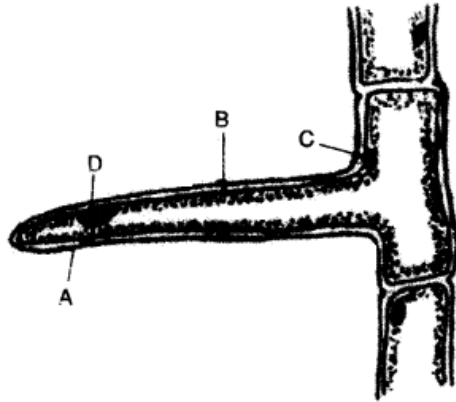
27. Potato cubes when placed in water become firm and increase in size. Give reason

(2011)

Answer:

Water is a hypotonic medium, so endosmosis occurs due to which water enters into potato cells making them firm and larger in size i.e., making them turgid.

28. The diagram below represents a layer of epidermal cells showing a fully-grown root hair. Study the diagram and answer the questions that follow :



- (i) Name the parts labelled A, B, C and D.
- (ii) The root hair cell is in a turgid state. Name and explain the process that caused this state.
- (iii) Mention one distinct difference between the parts labelled A and B.
- (iv) Draw a diagram of the above root hair cell as it would appear when a concentrated solution of fertiliser is added near it.

(2011)

Answer:

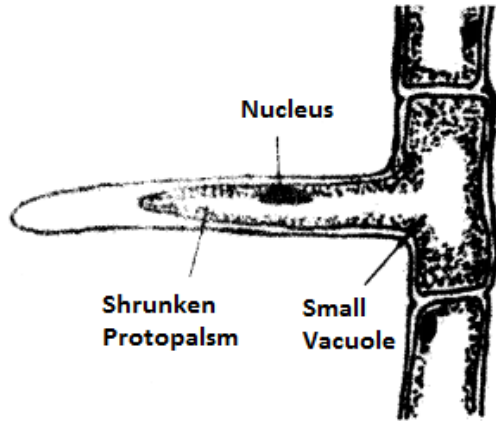
- (i) A – Cell wall of root hair.
 B – Cell membrane of root hair
 C – Cytoplasm
 D – Nucleus

(ii) The soil medium is hypotonic. So endosmosis occurs due to which the root hair cell turns turgid. Endosmosis is the process that caused this state. It is the process of movement of water from a hypotonic solution in which the cell is kept to the inside of the cell, making the cell turgid.

(iii)

A (Cell wall)	B (Cell membrane)
Is freely permeable	Is semi permeable

(iv)



29. Rewrite in logical sequence. Cortical cells, root hair, soil, water, endodermis, xylem. (entry of water into the plant from the soil)

(2010)

Answer:

Soil, Water, Root hair, Cortical cells, Endodermis, Xylem.

30. Explain diffusion

(2010)

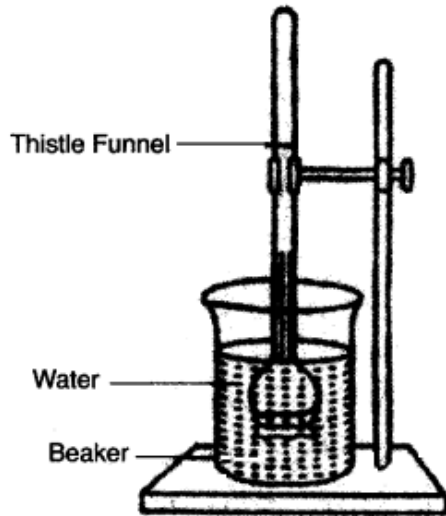
Answer:-

Diffusion: It is the process of movement of molecules of a substance (solid, liquid or gas) from the region of their higher concentration to the region of their lower concentration through the concentration gradient.

OR

Diffusion may be defined as the process of random movement of molecules of a substance from a region of higher concentration to a region of lower concentration.

31. Given below is the diagram of an apparatus set up to study a very important physiological process:



- (i) Name the process being studied.
- (ii) Explain the process.
- (iii) What change would you observe in the thistle funnel containing sugar solution after about 10 minutes ?
- (iv) Is sugar solution hypertonic or hypotonic ?
- (v) Name the part of the plant cell which is represented by the sugar solution.
- (vi) Explain why much salt is added to pickles.

(2010)

Answer:

- (i) Osmosis.
- (ii) The diffusion of water molecules through a semipermeable membrane from a dilute solution to concentrated solution.
- (iii) After about 10 minutes the sugar solution in the thistle funnel rises up.
- (iv) Hypotonic.
- (v) Cell sap of the root hair.
- (vi) The addition of much salt to pickles causes the water molecules to be drawn out of the germ cell by plasmolysis. Thus pickles can be preserved for a long duration. Bacteria and other disease causing agents like fungi can live only in a watery medium. Once the water is removed from the pickles, there are no favourable conditions for the bacteria to thrive well.

32. Explain turgidity

(2010)

Answer:

Turgidity: The state in which the cell wall is fully stretched and cannot accommodate any more water.

33. Account for : Wilted lettuce leaves become crisp /firm when placed in cold water for a while.

(2010)

Answer:

Wilted lettuce leaves when placed in cold water for a while absorb water through endosmosis, the cells of leaves become turgid and thus become crisp/firm.

