4. TRANSPORTATION THROUGH PLASMA MEMBRANE

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TEACHING TASK
Multiple Choice Questions

1.What material acts as a semi-permeable membrane in the osmosis experiment?
a) Potato b) Petri dish c) Sugar solution d) Water
Answer: (a) Potato
Explanation: The potato's cell walls act as a semi-permeable membrane, allowing water molecules to pass through while blocking larger sugar molecules.
2.Which direction does water move in the osmosis experiment with the potato cup?
a) Into the potato cup b) Out of the potato cup
c) Water remains stationary d) Water moves randomly
Answer: (a) Into the potato cup
Explanation: When the potato cup contains sugar solution (hypertonic), water moves from the petri dish (hypotonic) into the potato cup through osmosis.
3.What is the primary process responsible for the movement of water in the osmosis experiment?
a) Active transport b) Diffusion
c) Osmosis d) Filtration
Answer: (c) Osmosis
Explanation: Osmosis is the specific process of water moving across a semi-permeable membrane from low solute concentration to high solute concentration.
4.What does the term "osmosis" mean?
a) Pulling b) Pushing c) Spreading d) Shrinking
Answer: (a) Pulling
Explanation: Osmosis refers to the "pulling" of water molecules through a membrane due to concentration differences.
5.What is the effect of placing the potato cup in a sugar solution?
a) The cup shrinks b) The cup swells
c) No change occurs d) The cup dissolves
Answer: (b) The cup swells
Explanation: Water enters the potato cells from the sugar solution, causing the cells to swell (turgor pressure increases).
6.What is the purpose of marking the level of the sugar solution in the potato cup experiment?
a) To measure the volume of the solution
b) To compare with water level changes
c) To track osmosis progress d) To ensure safety
Answer: (c) To track osmosis progress

Explanation: The marked level helps observe and measure changes in liquid volume due to water movement.

7.What happens when a raisin is placed in a sugar solution?

a) It expands b) It contracts
c) It remains unchanged d) It dissolves

Answer: (b) It contracts

Explanation: In a hypertonic sugar solution, water moves out of the raisin cells, causing them to shrink (plasmolysis).

8.How does the concentration of solutes affect osmosis?

a) Higher concentration leads to osmosis
b) Lower concentration leads to osmosis
c) Concentration has no effect
d) Concentration affects diffusion, not osmosis

Answer: (a) Higher concentration leads to osmosis

Explanation: Osmosis occurs from areas of low solute concentration to high solute concentration.

9.What happens to the potato cup in the water-filled Petri dish?

a) It swells b) It shrinks c) No change occurs d) It dissolves

Answer: (a) It swells

Explanation: In pure water (hypotonic solution), water enters the potato cells, causing them to swell.

10.What is the key principle demonstrated by both the potato and raisin activities?

a) Active transport `b) Diffusion c) Osmosis d) Filtration

Answer: (c) Osmosis

Explanation: Both experiments demonstrate water movement across semi-permeable membranes due to concentration differences.

ADVANCED LEVEL QUESTIONS

More than One Answer Type

11.What process causes not the movement of water into or out of cells in the activities described?

A) Diffusion B) Osmosis C) Active transport D) Filtration

Answer: (c) Active transport, (d) Filtration

Explanation: Osmosis and diffusion are passive processes, while active transport requires energy, and filtration involves pressure-driven separation, not concentration gradients.

12.Which is not the parts of the cell are involved in regulating substance move ment?

A) Nucleus B) Plasma membrane
C) Mitochondria D) Golgi apparatus

Answer: (a) Nucleus, (d) Golgi apparatus

Explanation: The plasma membrane controls substance movement, while mitochondria produce energy for transport. The nucleus and Golgi apparatus are not directly involved in regulating osmosis/diffusion.

13.Which is not the purpose of adding sugar or salt to water in the prepara-

tion of a saturated solution?

A) To decrease the volume B) To increase the concentration of solute
C) To make it taste better D) To lower the boiling point

Answer: (a) To decrease the volume, (c) To make it taste better

Explanation: The main purpose is to increase solute concentration for osmosis experiments, not for taste or volume reduction.

Reason And Assertion Type

14Assertion: The potato cup loses water and shrinks when placed in the sugar solution.

Reason: Osmosis occurs, resulting in water moving out of the potato cup towards the higher concentration of solutes in the sugar solution.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: The potato cells lose water (plasmolysis) because the sugar solution is hypertonic, causing water to move out.

15.Assertion: The concentration of solutes influences the movement of water in osmosis.

Reason: Osmosis is the process of water moving from an area of lower solute concentration to higher solute concentration across a semi-permeable membrane.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Osmosis is directly driven by solute concentration differences, as stated in the Reason.

16.Assertion: The semi-permeable membrane plays a crucial role in osmosis.

Reason: It allows the passage of water molecules while restricting the move ment of solutes, facilitating the movement of water from areas of lower solute concentration to higher solute concentration.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: The membrane selectively permits water movement while blocking solutes, enabling osmosis.

Matrix Matching Type

17.

Column A	Column B
1. Egg (with shell)	A. Plant cell in hypotonic solution
2. Fresh cucumber slice	B.Plant cell in hypertonic solution
3. Plasmolysis	C.Placing in vinegar overnight
4. Turgor pressure	D.Placing in saltwater solution

Explanation:

Egg in vinegar (C): Vinegar dissolves the shell, demonstrating osmosis.
Cucumber in water (A): Swells due to water entering (hypotonic solution).
Plasmolysis (D): Cells shrink in saltwater (hypertonic solution).
Turgor pressure (B): Occurs when plant cells are full of water (hypotonic).

Comprehension Type

18. Substances constantly move in and out of cells through various mechanisms, ensuring the cell's proper function and survival. One essential process involved in substance movement is diffusion, where molecules move from regions of high concentration to low concentration until equilibrium is reached. This passive process occurs across the cell membrane, which acts as a selectively permeable barrier, allowing certain molecules to pass while restricting others based on size, charge, and solubility.Additionally, cells utilize specialized transport pro teins to facilitate the movement of specific substances across the membrane. These proteins can transport molecules against their concentration gradient, requiring energy in the form of ATP. Active transport is crucial for maintaining cellular homeostasis and ensuring the proper balance of ions and nutrients inside the cell.Furthermore, endocytosis and exocytosis are mechanisms em ployed by cells to engulf and release large molecules or particles, respectively. During endocytosis, the cell membrane forms vesicles to internalize substances from the extracellular environment, while exocytosis involves the fusion of vesicles containing cellular products with the cell membrane for secretion.Understanding the intricacies of substance movement through cells provides insight into cellular physiology and the mechanisms underlying vari ous biological processes.

i. What is the primary mechanism involved in the movement of molecules from regions of high concentration to low concentration?

A. Active transport B. Endocytosis C. Diffusion D. Exocytosis“

Answer: (c) Diffusion

Explanation: Diffusion is passive movement along the concentration gradient.

ii. Which process requires energy in the form of ATP?

A. Diffusion B. Endocytosis C. Exocytosis D. Active transport

Answer: (d) Active transport

Explanation: Active transport moves substances against their gradient using ATP.

iii. How do cells utilize transport proteins in substance movement?

A. By forming vesicles to internalize substances

B. By releasing cellular products into the extracellular environment

C. By facilitating the movement of specific substances across the membrane

D. By engulfing large molecules or particles from the extracellular environ ment

Answer: (c) By facilitating the movement of specific substances across the membrane

Explanation: Transport proteins enable selective passage of molecules (e.g., ion channels).

LEARNERS TASK

NEET LEVEL QUESTIONS

Multiple Choice Questions

1. What is the basic unit of life?

a) Molecules b) Atoms c) Cells d) Organs

Answer: (c) Cells
Explanation: Cells are the smallest structural and functional units that can perform all life processes.

2. Which chapter discusses the structure and functions of the cell?
a) Cell Anatomy b) Cellular Biology
c) Structure and Functions of the Cell d) Cellular Mechanisms

Answer: (c) Structure and Functions of the Cell
Explanation: This chapter typically covers cell structure and its various functions in detail.

3. What is the unique function of each part of the cell?
a) Reproduction
b) Energy production
c) Digestion
d) Contributing to the overall operation and health of the organism

Answer: (d) Contributing to the overall operation and health of the organism
Explanation: Each cellular component has specialized functions that collectively maintain the organism's health.

4. What are substances like glucose, water, and oxygen required for in cells?
a) Digestion b) Energy production c) Reproduction d) Cell division

Answer: (b) Energy production
Explanation: These substances are essential for cellular respiration and ATP production.

5. What determines the concentration of a solution?
a) The amount of solvent b) The amount of solute
c) The temperature d) The color of the solution

Answer: (b) The amount of solute
Explanation: Concentration depends on the quantity of solute dissolved in a given amount of solvent.

6. Which beaker contains the most concentrated solution?
a) Beaker I b) Beaker II c) Beaker III d) Beaker IV

Answer: [Cannot determine without additional information about solute amounts in each beaker]
Explanation: The most concentrated solution has the highest solute-to-solvent ratio.

7. What process describes the movement of water through a semi-permeable

membrane?
a) Diffusion b) Active transport c) Osmosis d) Filtration

Answer: (c) Osmosis
Explanation: Osmosis specifically refers to water movement across semi-permeable membranes.

8. In which solution does the raisin swell?
a) Tap water b) Saltwater c) Sugar solution d) Vinegar

Answer: (a) Tap water
Explanation: Raisins swell in hypotonic solutions (like tap water) as water enters the cells.

9. What happens to the raisin in the sugar solution?
a) It swells b) It remains unchanged c) It shrinks d) It dissolves

Answer: (c) It shrinks
Explanation: In hypertonic sugar solution, water leaves the raisin cells, causing shrinkage.

10. What is the aim of the osmosis experiment?
a) To observe the movement of materials in different solutions
b) To analyze the structure of a potato
c) To understand the concept of photosynthesis
d) To determine the pH level of water

Answer: (a) To observe the movement of materials in different solutions
Explanation: The experiment demonstrates how materials move across membranes in different solutions.

Advanced Level Questions
More than One Answer Type
11. Which substances are involved in the preparation of a sugar solution?
A) Sugar B) Water C) Salt D) Oil

Answer: (A) Sugar, (B) Water
Explanation: A sugar solution is made by dissolving sugar (solute) in water (solvent).

12. What materials are needed for the osmosis experiment?
A) Raw potato B) Petri dish C) Pins D) Vinegar

Answer: (A) Raw potato, (B) Petri dish
Explanation: These are essential materials for conducting the potato osmosis experiment.

13. Which activities involve observing changes in the size of objects placed in different solutions?
A) Observing a raisin in tap water
B) Observing a swollen raisin in a sugar solution
C) Observing a potato cup in a sugar solution
D) Observing a carrot in tap water

Answer: (A) Observing a raisin in tap water, (C) Observing a potato cup in a sugar solution
Explanation: Both demonstrate size changes due to osmosis in different solutions.
Reason and Assertion Type
14. Assertion: Water moves from tap water into the raisin.
Reason: The raisin has a higher concentration of solutes compared to tap water, leading to osmosis where water moves from an area of lower solute concentration to higher solute concentration.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.
Explanation: Raisins are hypertonic to tap water, causing water to enter through osmosis.

15. Assertion: The raisin shrinks in Fig-2 when placed in the sugar solution.
Reason: Osmosis occurs, with water moving out of the raisin due to the higher concentration of solutes in the sugar solution compared to the raisin.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.
Explanation: The sugar solution is hypertonic, drawing water out of the raisin cells.

16. Assertion: Water moves into the potato cup when placed in the sugar solution during the osmosis experiment.
Reason: Osmosis takes place, where water flows from the area of lower solute concentration (potato cup) to higher solute concentration (sugar solution).

Answer: Assertion is false but Reason is true.
Explanation: Water actually moves out of the potato into the hypertonic sugar solution.
Matrix Matching Type

17. Column A	**Column B**
1. Placed in a saltwater aquarium	C. Marine fish
2. Placed in a freshwater aquarium	D. Freshwater fish
3. Plant cell in distilled water	A. Turgid
4. Plant cell in concentrated salt solution	B. Plasmolyzed

Explanation:
Marine fish are adapted to saltwater (1-C)

Freshwater fish live in freshwater (2-D)
Plant cells swell in distilled water (3-A)
Plant cells shrink in salt solution (4-B)

Comprehension Type

i. Which substance serves as the primary source of energy for cellular activities?

A. Water B. Oxygen C. Glucose D. Carbon dioxide

Answer: (C) Glucose

Explanation: Glucose is the main fuel for cellular respiration and ATP production.

ii. What role does water play in cellular function?

A. Facilitating cellular respiration
B. Providing structural support to the cell
C. Serving as a source of energy
D. Transporting waste products out of the cell -

Answer: (B) Providing structural support to the cell

Explanation: Water maintains cell turgidity and participates in metabolic reactions.

iii. How is oxygen utilized by cells?

A. As a structural component of cell membranes
B. To regulate cellular temperature
C. In the process of photosynthesis
D. In oxidative processes essential for energy production

Answer: (D) In oxidative processes essential for energy production

Explanation: Oxygen is the final electron acceptor in aerobic respiration.

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TEACHING TASK

NEET LEVEL QUESTIONS

Multiple Choice Questions

1. What happens to the egg in salt water during the osmosis experiment?

a) It swells b) It shrinks c) No change occurs d) It dissolves

Answer: (b) It shrinks

Explanation: In the hypertonic salt solution, water moves out of the egg through osmosis, causing it to shrink.

2. Which term describes the process of water molecules leaving the cell?

a) Exosmosis b) Endosmosis c) Diffusion d) Osmosis

Answer: (a) Exosmosis

Explanation: Exosmosis specifically refers to water moving out of cells.

3. What process allows the entry of water into the egg in tap water during

the osmosis experiment?
a) Endosmosis b) Exosmosis c) Diffusion d) Filtration

Answer: (a) Endosmosis
Explanation: Endosmosis describes water entering cells when placed in hypotonic solutions.

4. What is the characteristic feature of the plasma membrane?
a) It is rigid b) It is nonliving
c) It is selectively permeable d) It is impermeable

Answer: (c) It is selectively permeable
Explanation: The plasma membrane allows some substances to pass while blocking others.

5. What is the primary role of the plasma membrane in cells?
a) Energy production b) Protection
c) Recognition d) Selective material passage

Answer: (d) Selective material passage
Explanation: Its main function is regulating what enters/exits the cell.

6. Which activity demonstrates the concept of selective permeability?
a) Filtration activity b) Osmosis experiment
c) Plasma membrane characteristics d) Endocytosis demonstration

Answer: (c) Plasma membrane characteristics
Explanation: The membrane's selective permeability is its defining feature.

7. What remains on the filter paper or cloth during the filtration activity?
a) Water b) Salt c) Flour particles d) Iodine

Answer: (c) Flour particles
Explanation: Larger flour particles are trapped while water/salt pass through.

8. What process allows cells to engulf substances from their external environment?
a) Osmosis b) Diffusion c) Recognition d) Endocytosis

Answer: (d) Endocytosis
Explanation: Endocytosis is the process of cellular "eating" of external materials.

9. What type of permeability does the plasma membrane possess?
a) Permeable b) Semipermeable c) Impermeable d) Selectively permeable

Answer: (d) Selectively permeable

Explanation: It selectively allows certain molecules to pass based on size/charge.

10. What process causes water molecules to enter the egg in tap water during the osmosis experiment?
a) Exosmosis b) Endosmosis c) Diffusion d) Filtration

Answer: (b) Endosmosis
Explanation: Water enters the egg (endosmosis) in hypotonic tap water.

Advanced Level Questions
More than One Answer Type

11. What materials are needed for the filtration activity?
A) Two beakers B) Funnel C) Filter paper D) Sugar

Answer: (A) Two beakers, (B) Funnel, (C) Filter paper
Explanation: These are essential for setting up filtration apparatus.

12. Which substances are allowed to pass through the filter paper or cloth in the filtration activity?
A) Water B) Sugar C) Iodine D) Wheat or rice flour particles

Answer: (A) Water, (B) Sugar, (C) Iodine
Explanation: These smaller molecules pass through while flour particles are trapped.

13. What characteristics describe the plasma membrane?
A) Selective permeability B) Rigid structure
C) Permeable to all substances D) Semi-permeable

Answer: (A) Selective permeability, (D) Semi-permeable
Explanation: These terms describe the membrane's controlled p**ermeability.**

Reason and Assertion Type
14. Assertion: The movement of materials through the cell membrane is similar to the filtration process.
Reason: Both involve allowing certain substances to pass through while blocking others.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.
Explanation: Both processes demonstrate selective permeability principles.

15. Assertion: Osmosis occurs when water molecules move from an area of high solute concentration to low solute concentration.
Reason: It is a process of passive transport across the plasma membrane.

Answer: Assertion is false but Reason is true.
Explanation: Osmosis moves water from low to high solute concentration (passively).

16. Assertion: The plasma membrane's selective permeability enables it to control the entry and exit of substances from the cell. Reason: This function is essential for maintaining the cell's internal environment.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.
Explanation: Selective permeability maintains cellular homeostasis.

Matrix Matching Type

17. Column A	**Column B**
1. Exosmosis	C. The process in which water molecules leave the cell
2. Endosmosis	A. The process in which water molecules enter the cell
3. Selective Permeability	D. Permits certain substances to enter or exit the cell
4. Plasma Membrane	B. Separates the cell's contents from the external environment

Explanation:
Exosmosis: Water exiting (1-C)
Endosmosis: Water entering (2-A)
Selective permeability: Controlled passage (3-D)
Plasma membrane: Cell boundary (4-B)

Comprehension Type
18.
i. What is one of the primary functions of the plasma membrane mentioned in the passage?
a) Energy production
b) Providing shape to the cell
c) Cellular respiration d) Protein synthesis
Answer: (b) Providing shape to the cell
Explanation: The passage mentions maintaining cellular structure.

ii. How does the plasma membrane contribute to cell protection?
a) By generating energy
b) By acting as a mechanical barrier
c) By facilitating cellular respiration
d) By promoting protein synthesis
Answer: (b) By acting as a mechanical barrier
Explanation: It protects internal components from external threats.

iii. Which statement accurately describes the role of the plasma membrane in cellular function?
a) It is responsible for cellular respiration.
b) It synthesizes proteins within the cell.

c) It regulates the cell's shape and protects internal contents.
d) It generates energy for cellular activities.
Answer: (c) It regulates the cell's shape and protects internal contents.
Explanation: This summarizes both structural and protective functions.

LEARNERS TASK

NEET LEVEL QUESTIONS

Multiple Choice Questions

1. What process is demonstrated by the filtration activity?
a) Diffusion b) Osmosis c) Filtration d) Active transport

Answer: (c) Filtration

Explanation: Filtration is the physical separation of solids from liquids using a porous medium.

2. What substance remains on the filter paper or cloth during the filtration activity?
a) Water b) Sugar c) Wheat or rice flour particles d) Iodine

Answer: (c) Wheat or rice flour particles

Explanation: Larger particles like flour are trapped while smaller molecules pass through.

3. What does the filter paper/cloth allow to pass through during the filtration activity?
a) Water and dissolved iodine b) Sugar and iodine
c) Flour particles d) Water only

Answer: (a) Water and dissolved iodine

Explanation: Small dissolved substances pass through while larger particles are retained.

4. Why are certain substances not allowed to pass through the filter paper during the filtration activity?
a) They are too small to pass through. b) They are too large to pass through. c) They are dissolved in water. d) They are attracted to the filter paper.

Answer: (b) They are too large to pass through.

Explanation: Filtration separates based on particle size.

5. What characteristic of the plasma membrane is highlighted in its selective permeability?
a) Mechanical barrier b) Recognition
c) Endocytosis d) Selective material passage

Answer: (d) Selective material passage

Explanation: Selective permeability allows controlled movement of substances.

6. What process enables cells to engulf substances from their external environment?
a) Osmosis b) Diffusion c) Recognition d) Endocytosis

Answer: (d) Endocytosis

Explanation: Cells engulf external material through membrane invagination.

7. What type of permeability does the plasma membrane possess?
a) Impermeable b) Permeable c) Semipermeable d) Selectively permeable

Answer: (d) Selectively permeable

Explanation: It allows specific substances to pass based on cellular needs.

8. What is the primary function of the plasma membrane?
a) Energy production b) Protection
c) Recognition d) Selective material passage

Answer: (d) Selective material passage

Explanation: Its main role is regulating what enters/exits the cell.

9. Which activity helps understand the movement of water in animals?
a) Filtration activity b) Osmosis experiment
c) Plasma membrane characteristics d) Endocytosis demonstration

Answer: (b) Osmosis experiment

Explanation: Demonstrates water movement across membranes.

10. What substance causes exosmosis in the egg during the osmosis experiment?
a) Tap water b) Salt water c) Dilute HCl d) Iodine

Answer: (b) Salt water

Explanation: Hypertonic salt solution draws water out of the egg.

Advanced Level Questions

More than One Answer Type

11. What functions are attributed to the plasma membrane?
A) Providing shape to the cell B) Endocytosis
C) Permeability to all substances D) Surface recognition

Answer: (A) Providing shape, (B) Endocytosis, (D) Surface recognition

Explanation: These are key membrane functions (C is incorrect as permeability is selective).

12. What types of permeability are exhibited by the plasma membrane?
A) Impermeable B) Permeable C) Selectively permeable D) Semipermeable

Answer: (C) Selectively permeable, (D) Semipermeable

Explanation: These terms describe its controlled permeability.

13. What materials are required for the osmosis experiment with eggs?
A) Beakers B) Salt C) Dilute HCl or toilet cleaning acid D) Raw eggs

Answer: (A) Beakers, (B) Salt, (D) Raw eggs

Explanation: These are essential for the egg osmosis experiment.

Reason and Assertion Type

14. Assertion: The plasma membrane is selectively permeable.
Reason: It allows certain substances to enter and exit while preventing others from passing through.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: This is the definition of selective permeability.

15. Assertion: Endosmosis leads to swelling of the cell.
Reason: It involves the entry of water molecules into the cell.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Water entry causes cell swelling (turgor pressure).

16. Assertion: The function of the plasma membrane includes providing shape to the cell.
Reason: It acts as a mechanical barrier, protecting the internal contents of the cell.

Answer: Both Assertion and Reason are true, but Reason does not explain Assertion.

Explanation: While both are true functions, they are separate characteristics.

Matrix Matching Type

17. Column A	**Column B**
1. Filter Paper/Cloth	E. Permits certain materials to pass through while blocking others
2. Plasma Membrane	D. Separates cell contents from external environment
3. Selective Permeability	A. Allows certain substances to enter/exit the cell
4. Endocytosis	(No match in given options - typically "engulfing external materials")

5. Osmosis B. Tiny water channels allowing osmosis

Explanation:

Filter paper shows selective passage (1-E)

Plasma membrane is the cell boundary (2-D)

Selective permeability regulates transport (3-A)

Osmosis involves aquaporins (water channels) (5-B)

Comprehension Type
18.

i. What is the primary characteristic of the plasma membrane mentioned in the passage?
a) Permeability to all substances
b) Selective permeability
c) Impermeability
d) Elasticity

Answer: (b) Selective permeability

Explanation: The passage emphasizes this as its key feature.

ii. Which of the following statements accurately describes the plasma membrane's permeability to water?
a) It prevents the passage of water molecules.
b) It permits only a limited amount of water to pass through.
c) It allows water to freely pass through.
d) It selectively allows only certain types of water molecules to enter.
Answer: (c) It allows water to freely pass through.
Explanation: Water permeability is specifically mentioned.

iii. What role does selective material passage play in the plasma membrane?
a) It blocks the passage of all dissolved materials.
b) It permits all dissolved materials to enter the cell.
c) It allows specific dissolved materials to pass through while blocking others.
d) It regulates the movement of gases only.
Answer: (c) It allows specific dissolved materials to pass through while blocking others.
Explanation: This defines selective permeability's function.

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TEACHING TASK

NEET LEVEL QUESTIONS

Multiple Choice Questions

1. What is the purpose of soaking the raw egg in dilute HCl?
a) To dissolve the egg membrane
b) To dissolve the egg shells
c) To increase the permeability of the egg membrane
d) To decrease the permeability of the egg membrane

Answer: (b) To dissolve the egg shells

Explanation: Dilute HCl dissolves the calcium carbonate eggshell while leaving the semi-permeable membrane intact.

2. Why is the egg membrane washed with fresh water after draining the contents?
a) To increase its permeability b) To remove excess HCl
c) To strengthen the membrane d) To prevent osmosis

Answer: (b) To remove excess HCl

Explanation: Washing neutralizes any remaining acid that could affect the experiment.

3. What is the function of the thread tied around the mouth of the egg membrane?
a) To prevent leakage of contents
b) To increase permeability
c) To allow free movement of materials
d) To dissolve the membrane

Answer: (a) To prevent leakage of contents

Explanation: The thread creates a watertight seal for the experiment.

4. Which process describes the movement of water from a region of low solute concentration to high solute concentration?
a) Endosmosis b) Exosmosis c) Osmosis d) Diffusion

Answer: (c) Osmosis

Explanation: Osmosis specifically refers to water movement across membranes.

5. What happens to the volume of sugar solution in the egg membrane placed in tap water?
a) It decreases b) It remains the same c) It increases d) It disappears

Answer: (c) It increases

Explanation: Water enters through osmosis as tap water is hypotonic.

6. Why does the volume of sugar solution increase in the egg membrane placed in tap water?
a) Due to exosmosis
b) Due to osmosis
c) Due to diffusion
d) Due to endosmosis

Answer: (d) Due to endosmosis

Explanation: Endosmosis refers specifically to water entering cells/membranes.

7. Which solution has a higher concentration of solute: tap water or sugar solution?
a) Tap water b) Sugar solution
c) Both have the same concentration d) None of the above

Answer: (b) Sugar solution

Explanation: Sugar solution is hypertonic compared to tap water.

8. What principle explains the movement of water across membranes?
a) Diffusion b) Selective permeability
c) Active transport d) Facilitated diffusion

Answer: (b) Selective permeability

Explanation: Membranes allow water but block solutes, enabling osmosis.

9. Which substance is used to fill the egg membrane in the first activity?
a) Sugar solution b) Tap water c) HCl d) Egg white

Answer: (a) Sugar solution

Explanation: The concentrated solution creates the osmotic gradient.

10. What is the purpose of placing the egg membrane filled with tap water in sugar solution?
a) To increase the volume of tap water
b) To decrease the volume of tap water
c) To observe osmosis
d) To observe diffusion

Answer: (c) To observe osmosis

Explanation: This setup demonstrates water movement across membranes.

Advanced Level Questions

More than One Answer Type

11. What is the principle process responsible for the observed changes in the egg membranes?
a) Diffusion b) Active transport c) Osmosis d) Filtration

Answer: (c) Osmosis

Explanation: Water movement is driven by osmotic pressure.

12. What determines the direction of water movement across the membrane?
a) Concentration of water only b) Concentration of solute only
c) Both concentration of water and solute d) Temperature

Answer: (c) Both concentration of water and solute

Explanation: Osmosis depends on relative solute concentrations.

13. How does the principle of osmosis relate to the movement of substances in and out of cells?
a) It prevents substances from entering or leaving cells
b) It facilitates the movement of water across cell membranes
c) It promotes the movement of solutes against their concentration gradient
d) It has no relevance to cellular processes

Answer: (b) It facilitates the movement of water across cell membranes

Explanation: Osmosis regulates cellular water balance.

Reason and Assertion Type

14. Assertion: Leaving the egg membrane in tap water overnight allows osmosis to occur.
Reason: This enables observation of water movement across the semi-permeable membrane in response to concentration gradient.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Time allows measurable osmotic changes to occur.

15. Assertion: Using the same sugar solution ensures consistency in concentration gradient.
Reason: This allows fair comparison of osmotic processes between activities.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Controlled variables are essential for valid experiments.

16. Assertion: The semi-permeable membrane selectively allows water passage.
Reason: This facilitates observation of osmosis as water moves to equalize concentrations.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: The membrane's selectivity enables the demonstration.

Matrix Matching Type

17. Column A **Column B**

1. Placing a plant cell in hypertonic solution B. Exosmosis
2. Submerging a raisin in water A. Endosmosis
3. Adding sugar to a cup of tea D. No osmosis occurs
4. Salting eggplant slices before cooking C. Osmosis

Explanation:

Hypertonic solution causes water exit (1-B)

Raisin in water swells (2-A)

Sugar dissolves without membrane (3-D)

Salt draws out water (4-C)

Comprehension Type
18.

i. What is the purpose of filling the egg membrane with saturated sugar solution?
a) Observe sugar movement
b) Create concentrated environment
c) Prevent osmosis
d) Facilitate water entry

Answer: (b) Create concentrated environment

Explanation: Establishes osmotic gradient.

ii. Why is the mouth tied with thread?
a) Allow leakage
b) Prevent water entry
c) Securely contain contents
d) Facilitate molecule movement
Answer: (c) Securely contain contents
Explanation: Maintains experimental integrity.

iii. What phenomenon is observed?
a) Osmosis b) Diffusion c) Active transport d) Filtration
Answer: (a) Osmosis
Explanation: The experiment demonstrates osmotic principles.

LEARNERS TASK
NEET LEVEL QUESTIONS

Multiple Choice Questions

1. How long is the egg membrane left in tap water in the first activity?
a) 1 hour b) Overnight c) 4-5 hours d) 10 minutes

Answer: (b) Overnight

Explanation: This extended time allows sufficient osmosis to occur for observable results.

2. What component of the egg dissolves when soaked in dilute HCl?
a) Egg membrane b) Egg yolk c) Egg shells d) Egg white

Answer: (c) Egg shells

Explanation: The calcium carbonate shell reacts with HCl while the membrane remains intact.

3. What does the egg membrane resemble in terms of permeability?
a) A solid barrier b) A semi-permeable membrane
c) A fully permeable membrane d) A impermeable membrane

Answer: (b) A semi-permeable membrane

Explanation: It selectively allows water but blocks larger molecules like sugar.

4. What is the role of the egg membrane in the experiment?
a) To facilitate osmosis b) To prevent osmosis
c) To increase solute concentration d) To decrease solute concentration

Answer: (a) To facilitate osmosis

Explanation: The membrane enables selective water movement for osmosis.

5. What substance is used to dissolve the egg shells?
a) HCl b) Tap water c) Sugar solution d) Vinegar

Answer: (a) HCl

Explanation: Hydrochloric acid effectively dissolves calcium carbonate shells.

6. How is the mouth of the egg membrane sealed?
a) Tied with a thread b) Covered with tape c) Welded shut d) Sealed with wax

Answer: (a) Tied with a thread

Explanation: Thread provides a secure, watertight seal for the experiment.

7. What process causes the movement of water across the egg membrane?
a) Diffusion b) Active transport c) Osmosis d) Filtration

Answer: (c) Osmosis

Explanation: Water moves passively across the membrane due to concentration differences.

8. Which solution is placed in the beaker when the egg membrane is filled with tap water?
a) Tap water b) Sugar solution c) Dilute HCl d) Vinegar

Answer: (b) Sugar solution

Explanation: Creates osmotic gradient with membrane's tap water.

9. What is the function of the egg membrane in the experiment?
a) To act as a control b) To facilitate the movement of water
c) To prevent the movement of water d) To increase the solute concentration

Answer: (b) To facilitate the movement of water

Explanation: It serves as the semi-permeable barrier for osmosis.

10. What term describes the movement of water from a region of high water concentration to low water concentration?
a) Endosmosis b) Exosmosis c) Osmosis d) Diffusion

Answer: (c) Osmosis

Explanation: This is the fundamental definition of osmosis.

Advanced Level Questions

More than One Answer Type

11. Which substance is used to dissolve the eggshell in the preparation of the semi-permeable membrane?
a) Dilute HCl b) Tap water c) Saturated sugar solution d) $CaCO_3$

Answer: (a) Dilute HCl

Explanation: Only HCl dissolves the calcium carbonate shell effectively.

12. What is the purpose of piercing a hole in the egg membrane during the preparation process?
a) To drain the egg contents
b) To allow substances to freely enter the egg
c) To increase the strength of the membrane
d) To prevent osmosis

Answer: (a) To drain the egg contents

Explanation: Creates an opening to remove yolk and white while preserving membrane.

13. What type of membrane is formed after the preparation process?
a) Semi-permeable b) Impermeable c) Permeable d) Selectively permeable

Answer: (a) Semi-permeable, (d) Selectively permeable

Explanation: These terms are interchangeable for describing the membrane's properties.

Reason and Assertion Type

14. Assertion: Soaking in dilute HCl dissolves calcium carbonate shells.
Reason: This leaves behind the semi-permeable membrane for experimentation.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: The chemical reaction prepares the experimental material.

15. Assertion: Washing removes residual HCl and egg contents.
Reason: This ensures clean membrane without experimental interference.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Proper cleaning is essential for accurate results.

16. Assertion: Tying prevents sugar solution leakage.
Reason: Ensures accurate measurement during experimentation.

Answer: Both Assertion and Reason are true, and Reason correctly explains Assertion.

Explanation: Secure containment maintains experimental integrity.

Matrix Matching Type

17. Column A	**Column B**
1. Osmosis	B. Movement of water across a semi-permeable membrane
2. Semi-permeable membrane	D. Allows only certain substances to pass through
3. Endosmosis	A. Movement of water into a cell/membrane
4. Exosmosis	C. Movement of water out of a cell/membrane

Explanation:

Osmosis is the general process (1-B)

Membrane property (2-D)

Water entering (3-A)

Water exiting (4-C)

Comprehension Type

18.

i. What is the function of the semi-permeable membrane surrounding the egg white?

a) Allowing free entry of all substances
b) Regulating the passage of materials into the egg
c) Preventing the entry of water and nutrients
d) Acting as a sturdy shield similar to the eggshell

Answer: (b) Regulating the passage of materials into the egg

Explanation: It selectively controls what enters the egg.

ii. How does the semi-permeable membrane differ from the eggshell?
a) Both allow unrestricted passage
b) The eggshell is thin and delicate, while the membrane is sturdy
c) The membrane selectively allows only certain molecules to pass through d) The eggshell prevents the entry of water and nutrients
Answer: (c) The membrane selectively allows only certain molecules to pass through
Explanation: Key difference in permeability properties.

iii. Why is the semi-permeable membrane essential for proper egg development?
a) It allows harmful substances to enter
b) It prevents all substance entry
c) It selectively allows vital nutrients and water to permeate
d) It serves no significant function
Answer: (c) It selectively allows vital nutrients and water to permeate
Explanation: Maintains optimal internal conditions for development.

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TEACHING TASK
NEET LEVEL QUESTIONS
Multiple Choice Questions

1. What is the primary aim of the diffusion experiment with potassium permanganate?

a) To observe diffusion in solids

b) To compare diffusion rates between substances

c) To understand the relationship between time and movement

d) To demonstrate diffusion in liquids

Answer: (d) To demonstrate diffusion in liquids

Explanation: The experiment visually shows how solute particles spread in a liquid medium.

2. How does diffusion differ from osmosis?

a) Diffusion involves movement of water molecules only.

b) Osmosis involves movement of solute molecules only.

c) Diffusion involves movement of solute molecules from high to low concentration.

d) Osmosis involves movement of solvent molecules across a semi-permeable membrane.

Answer: (d) Osmosis involves movement of solvent molecules across a semi-permeable membrane.

Explanation: Diffusion is the movement of solute particles, while osmosis specifically refers to solvent (usually water) movement.

3. Which experiment investigates diffusion using different substances?

a) Diffusion with coffee powder

b) Diffusion with potassium permanganate

c) Comparing diffusion of different substances

d) Diffusion with copper sulphate

Answer: (c) Comparing diffusion of different substances

Explanation: This experiment compares how different solutes diffuse under similar conditions.

4. What does diffusion primarily involve?

a) Movement of solute molecules from low to high concentration

b) Movement of solvent molecules only

c) Movement of solute molecules from high to low concentration

d) Movement of gases only

Answer: (c) Movement of solute molecules from high to low concentration

Explanation: Diffusion is the passive movement of solutes down their concentration gradient.

5. Which process allows substances to spread equally throughout a medium like air or water?

a) Filtration

b) Osmosis

c) Active transport

d) Diffusion

Answer: (d) Diffusion

Explanation: Diffusion leads to uniform distribution of particles in a medium.

6. What happens when a crystal of potassium permanganate is placed in water initially in the experiment?

a) It remains confined to the crystal's area.

b) It spreads rapidly throughout the water.

c) It evaporates.

d) It solidifies.

Answer: (a) It remains confined to the crystal's area.

Explanation: Initially, the solute particles are concentrated near the crystal before spreading.

7. **In the diffusion experiment with coffee powder, what does the movement of coffee particles represent?**

a) Osmosis

b) Active transport

c) Diffusion

d) Facilitated diffusion

Answer: (c) Diffusion

Explanation: The coffee particles disperse in water due to diffusion.

8. Which factor affects the rate of diffusion in the potassium permanganate experiment?

a) pH of the water

b) Size of the crystal

c) Temperature

d) Color of the dish

Answer: (c) Temperature

Explanation: Higher temperatures increase kinetic energy, speeding up diffusion.

9. What is the purpose of comparing the diffusion of different substances?

a) To understand the role of osmosis in cells

b) To demonstrate the principles of filtration

c) To observe how different factors affect the rate and pattern of diffusion

d) To investigate the process of photosynthesis

Answer: (c) To observe how different factors affect the rate and pattern of diffusion

Explanation: Comparing different substances helps analyze diffusion behavior.

10.Which process involves the movement of solute molecules across a semi-permeable membrane?

a) Diffusion

b) Osmosis

c) Active transport

d) Filtration

Answer: (a) Diffusion

Explanation: Diffusion can occur across membranes, but osmosis specifically involves solvent movement.

Advanced Level Questions

More than One Answer Type

11. How does temperature affect the rate of diffusion?

a) Higher temperatures increase the rate of diffusion

b) Lower temperatures increase the rate of diffusion

c) Temperature has no effect on diffusion

d) Temperature only affects osmosis, not diffusion

Answer: (a) Higher temperatures increase the rate of diffusion

Explanation: Increased temperature provides more energy for molecular movement.

12. What happens when coffee powder is added to hot water in the diffusion experiment?

a) The coffee powder sinks to the bottom

b) The coffee powder forms clumps

c) The rate of diffusion increases

d) The rate of diffusion decreases

Answer: (c) The rate of diffusion increases

Explanation: Hot water increases molecular motion, speeding up diffusion.

13. Which substances were used in the diffusion experiment with other substances?

a) Salt and sugar

b) Copper sulphate and ink

c) Vinegar and baking soda

d) Lemon juice and oil

Answer: (b) Copper sulphate and ink

Explanation: These substances are commonly used to compare diffusion rates.

Reason and Assertion Type

14. Assertion: Osmosis is involved in waste removal in living organisms.

Reason: Osmosis enables the kidneys to filter waste products from the blood.

Answer: Both assertion and reason are true, and the reason correctly explains the assertion.

Explanation: Osmosis helps in reabsorbing water during urine formation, aiding waste removal by the kidneys.

15. Assertion: Osmosis plays a role in gas exchange in respiratory systems.

Reason: Oxygen and carbon dioxide move across membranes through osmosis in response to concentration gradients.

Answer: Assertion is false, but the reason is true.

Explanation: Gas exchange occurs via diffusion, not osmosis.

16. Assertion: Osmosis regulates the size of cells in living organisms.

Reason: Cells in hypertonic solutions gain water through osmosis, leading to cell shrinkage.

Answer: Assertion is true, but the reason is false.

Explanation: Cells in hypertonic solutions lose water, causing shrinkage.

Matrix Matching Type

Match the following terms with their significance in living organisms:

17. Column A	**Column B**
1. Osmosis	B. Water uptake in plant roots
2. Diffusion	A. Spread of perfume in a room
3. Stomatal function	C. Movement of substances within a medium
4. Waste filtration	D. Movement of waste materials in the human body

Comprehension Type

Questions from the passage:

18.

i. What is the initial step in the experiment involving potassium permanganate in a Petri dish?

a) Filling the Petri dish with water

b) Observing the movement of the purple color

c) Placing a small crystal of potassium permanganate in the center

d) Adding other substances to the Petri dish

Answer: (c) Placing a small crystal of potassium permanganate in the center

Explanation : The experiment starts by carefully placing the crystal in water using forceps.

ii. What phenomenon is demonstrated by the movement of the purple color from the central crystal in the Petri dish?

a) Osmosis

b) Diffusion

c) Filtration

d) Sublimation

Answer: (b) Diffusion

Explanation : The gradual spread of KMnO4 molecules in water is diffusion (movement from high to low concentration).

iii. How does the spread of the purple color in the Petri dish change over time?

a) It remains concentrated around the central crystal.

b) It spreads unevenly, with areas of high and low concentration.

c) It gradually spreads further from the center, indicating diffusion.

d) It dissipates rapidly, leaving the Petri dish colorless.

Answer: (c) It gradually spreads further from the center, indicating diffusion.

Explanation: Diffusion leads to uniform distribution; the purple color slowly fills the dish.

LEARNERS TASK
NEET LEVEL QUESTIONS
Multiple Choice Questions

1. What is the primary role of osmosis in plants?

Options:

A) Transport of gases

B) Absorption of nutrients

C) Water uptake in roots

D) Photosynthesis facilitation

Answer: (C) Water uptake in roots

Explanation: Osmosis helps plants absorb water from the soil through their roots, maintaining cell turgidity and supporting growth.

2. In animals, what is one function of osmosis?

Options:

A) Waste filtration

B) Muscle contraction

C) Nerve impulse transmission

D) Bone formation

Answer: (A) Waste filtration

Explanation: Osmosis plays a role in kidney function, helping filter waste products from the blood.

3. Which process allows for the movement of waste materials in the human body?

Options:

A) Osmosis

B) Diffusion

C) Active transport

D) Photosynthesis

Answer: (B) Diffusion

Explanation: Diffusion allows waste materials to move from areas of high concentration (e.g., blood) to low concentration (e.g., urine).

4. How does osmosis contribute to stomatal function in plants?

Options:

A) By regulating hormone levels

B) By controlling leaf coloration

C) By facilitating gas exchange

D) By regulating water loss

Answer: (D) By regulating water loss

Explanation: Osmosis controls water movement in guard cells, opening and closing stomata to regulate transpiration.

5. Which process is related to osmosis and involves the movement of substances from high to low concentration?

Options:

A) Active transport

B) Facilitated diffusion

C) Filtration

D) Diffusion

Answer: (D) Diffusion

Explanation: Both diffusion and osmosis involve passive movement along a concentration gradient, but osmosis specifically refers to water movement.

6. In the diffusion experiment with coffee powder, what is observed when hot water is used instead of cold water?

Options:

A) Slower diffusion

B) No diffusion

C) Faster diffusion

D) Unchanged diffusion

Answer: (C) Faster diffusion

Explanation: Higher temperature increases molecular motion, speeding up diffusion.

7. What is the primary purpose of the basic diffusion experiment with coffee powder?

Options:

A) To observe the movement of coffee powder in water

B) To compare diffusion rates of different substances

C) To demonstrate the effect of temperature on diffusion

D) To understand osmosis in plants

Answer: (A) To observe the movement of coffee powder in water

Explanation: The experiment visually demonstrates how particles spread in a liquid.

8. What happens when a crystal of potassium permanganate is placed in water in the diffusion experiment?

Options:

A) It sinks to the bottom.

B) It remains stationary.

C) It dissolves and spreads its color.

D) It evaporates.

Answer: (C) It dissolves and spreads its color.

Explanation: The crystal diffuses, creating a visible gradient of color in the water.

9. Which substance is commonly used in diffusion experiments to observe movement in a medium?

Options:

A) Salt

B) Sugar

C) Coffee powder

D) Vinegar

Answer: (C) Coffee powder

Explanation: Coffee powder provides visible particles to track diffusion.

10. How does temperature affect the rate of diffusion?

Options:

A) It decreases diffusion

B) It has no effect on diffusion

C) It increases diffusion

D) It reverses diffusion

Answer: (C) It increases diffusion

Explanation: Higher temperature = faster particle movement = quicker diffusion.

Advanced Level

11. In animals, which process helps in filtering waste materials from the blood?

Options:

a) Osmosis

b) Active transport

c) Diffusion

d) Filtration

Answer: (a), (c), (d)

Explanation: Kidneys use osmosis (water balance), diffusion (waste movement), and filtration (physical separation).

12. What role does osmosis play in the absorption of nutrients in animals?

Options:

a) It helps in breaking down nutrients

b) It facilitates the movement of nutrients across cell membranes

c) It regulates nutrient synthesis

d) It has no role in nutrient absorption

Answer: (b)

Explanation: Osmosis maintains water balance, aiding nutrient transport via solvent drag.

13. Which related process is responsible for the uniform spreading of the smell in a room?

Options:

a) Osmosis

b) Active transport

c) Diffusion

d) Filtration

Answer: (c) Diffusion

Explanation: Gas molecules (e.g., perfume) spread via diffusion from high to low concentration.

Reason & Assertion Type Questions

14.

Assertion: Osmosis is essential for maintaining the structural integrity of plant cells.

Reason: It regulates the movement of water into the cell vacuoles, maintaining turgor pressure.

Answer: Both Assertion and Reason are true, and the Reason correctly explains the Assertion.

Explanation:

Assertion (True): Plant cells rely on turgor pressure (rigidity due to water-filled vacuoles) to maintain structure. Without osmosis, cells would lose water and wilt (plasmolysis).

Reason (True & Correct Explanation): Osmosis allows water to enter vacuoles, creating pressure against the cell wall. This turgor pressure prevents plants from drooping.

15.

Assertion: Osmosis aids in the absorption of nutrients in the digestive system.

Reason: Nutrient absorption occurs through osmosis, where water follows the concentration gradient.

Answer: Assertion is true, but the Reason is false.

Explanation:

Assertion (Partially True): Osmosis indirectly aids nutrient absorption by maintaining water balance in the intestines, but it is not the primary mechanism.

Reason (False): Nutrient absorption mainly occurs via active transport (e.g., glucose, amino acids) or facilitated diffusion (e.g., fructose). Osmosis only moves water, not nutrients.

16.

Assertion: Osmosis helps regulate blood pressure in living organisms.

Reason: Proteins in the blood exert osmotic pressure, maintaining blood volume and pressure within normal limits.

Answer: Both Assertion and Reason are true, and the Reason correctly explains the Assertion.

Explanation:

Assertion (True): Osmosis balances fluids between blood and tissues, preventing excessive fluid loss/gain (e.g., edema or dehydration).

Reason (True & Correct Explanation): Blood contains plasma proteins (e.g., albumin) that create colloid osmotic pressure, pulling water back into blood vessels. This maintains:

Blood volume ? Stable pressure.

Prevents swelling (e.g., in capillaries).

Matrix Matching Type

17. Match the following substances with their behavior in water:

1. Coffee powder C. Gradual spreading throughout the water

2. Salt A. Uniform diffusion

3. Copper sulphate B. Pink color spreading from a central crystal

4. Ink D. Movement from high concentration to low concentration

Comprehension Type

18.

i. What is one significant role of osmosis in waste management within the human body?

Options:

a) Absorption of nutrients

b) Filtration of waste materials from the blood

c) Regulation of blood pressure

d) Transport of gases in the respiratory system

Answer: (b) Filtration of waste materials from the blood

Explanation: Osmosis helps kidneys filter waste (e.g., urea) by moving water/wastes across membranes.

ii. Where does waste filtration predominantly occur in the human body?

Options:

a) Liver

b) Lungs

c) Kidneys

d) Stomach

Answer: (c) Kidneys

Explanation: Kidneys use osmosis to filter blood and remove toxins via urine.

iii. How does osmosis aid in waste filtration?

Options:

a) By facilitating the movement of water and dissolved waste products across semi-permeable membranes

b) By regulating blood pressure

c) By absorbing nutrients from the bloodstream

d) By assisting in gas exchange in the respiratory system

Answer: (a) Moves water/wastes across semi-permeable membranes

Explanation: Osmosis allows selective removal of wastes while retaining essential blood components.