

Complete Questions Answers



Revise, Reflect, Refine

1. Differentiate between the following pairs of terms based on the clues given in parentheses:

- (i) Cell membrane and cell wall (permeability)
- (ii) RER and SER (structure)
- (iii) Chloroplasts and chromoplasts (pigments)

Basis	Cell Membrane	Cell Wall
Permeability	Selectively permeable (allows only some substances to pass)	Freely permeable (allows most substances to pass)

Basis	RER (Rough Endoplasmic Reticulum)	SER (Smooth Endoplasmic Reticulum)
Structure	Ribosomes are present on the surface, so it looks rough	Ribosomes are absent, so it looks smooth

Basis	Chloroplasts	Chromoplasts
Pigments	Contain green pigment chlorophyll	Contain coloured pigments like red, yellow, and orange carotenoids

2. Two similar animal cells are placed in two different solutions:

* Cell X is placed in pure water.

* Cell Y is placed in a concentrated salt solution:

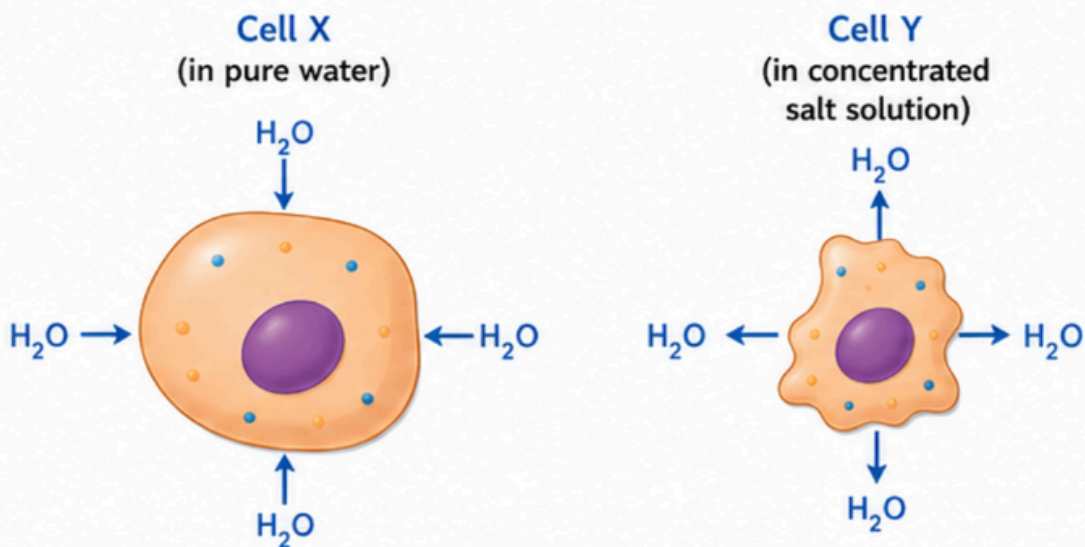
Cells are observed after some time. Cell X swells, and Cell Y shrinks.

Which statement provides the correct explanation for the above observations?

- (i) Salt molecules moved into Cell Y, causing it to shrink.
- (ii) Water moved into Cell X and more water moved out of Cell Y than the salt solution entered in it.
- (iii) Water moved into Cell X and moved out of Cell Y through the cell membrane.
- (iv) Solute movement caused osmosis in both cells.

Answer (English):

Cells are observed after some time. Cell X swells, and Cell Y shrinks.



Which statement provides the correct explanation for the above observations?

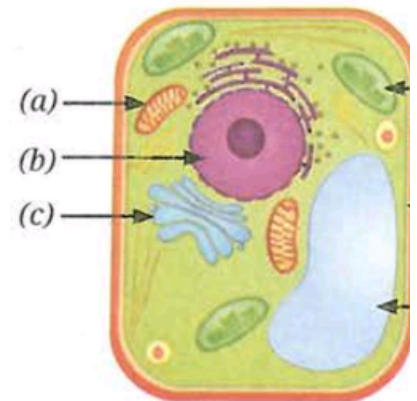
- (i) Salt molecules moved into Cell Y, causing it to shrink. **X Incorrect**
Salt does not need to enter the cell to cause shrinkage; water movement is responsible.
- (ii) Water moved into Cell X and more water moved out of Cell Y than the salt solution entered in it. **✓ Correct**
In pure water, water enters Cell X by osmosis causing it to swell.
In concentrated salt solution, more water leaves Cell Y than the solution enters, causing it to shrink.
- (iii) Water moved into Cell X and moved out of Cell Y through the cell membrane. **X Incorrect**
It is incomplete as it does not mention that more water moved out of Cell Y than the salt solution entered.
- (iv) Solute movement caused osmosis in both cells. **X Incorrect**
Osmosis is the movement of water, not solute.

Correct Answer: (ii) Water moved into Cell X and more water moved out of Cell Y than the salt solution entered in it.

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3. Look at the diagram of a cell in Fig. 2.20. Identify the parts labelled from (a) to (g) and correctly match them with their functions given below:

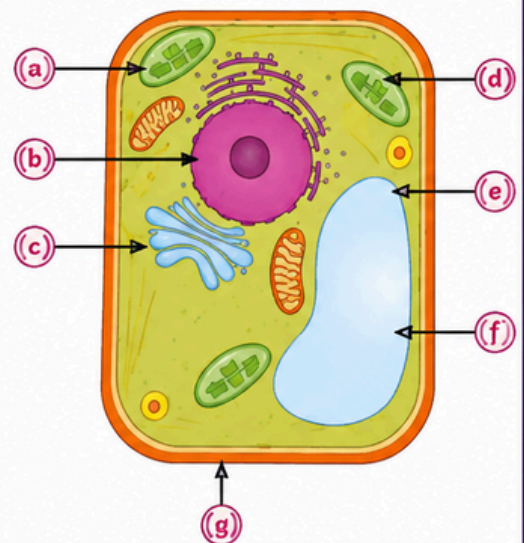
- (i) Controlling all the activities of a cell.
- (ii) Site of cellular respiration.
- (iii) Storage organelle that also provides rigidity to the cell.
- (iv) Separates the cell contents from surroundings.
- (v) Provides structural rigidity to the cell.
- (vi) Packs and stores materials received from ER.
- (vii) Helps in manufacturing food.



ANSWER

3. Look at the diagram of a cell in Fig. 2.20. Identify the parts labelled from (a) to (g) and correctly match them with their functions given below:

Label (a) to (g)	Part of the Cell	Function (Number)	Function
(a)	Chloroplast	(vii)	Helps in manufacturing food.
(b)	Nucleus	(i)	Controlling all the activities of a cell.
(c)	Golgi apparatus	(vi)	Packs and stores materials received from ER.
(d)	Mitochondrion	(ii)	Site of cellular respiration.
(e)	Vacuole	(iii)	Storage organelle that also provides rigidity to the cell.
(f)	Cell membrane	(iv)	Separates the cell contents from surroundings.
(g)	Cell wall	(v)	Provides structural rigidity to the cell.



Quick Tip!

Remember:

Nucleus is the control centre, chloroplasts make food, mitochondria release energy, vacuole stores, membrane protects, cell wall supports!

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4. Which of the following option(s) of the pairs of cell organelles are correctly placed under the given categories?

Fig. 2.













Option	Present in the plant cells	Absent in the animal cells
(i)	Leucoplast	Cell wall
(ii)	Mitochondria	Ribosome
(iii)	Cell wall	Golgi apparatus
(iv)	Lysosome	Endoplasmic reticulum

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4.





Which of the following option(s) of the pairs of cell organelles are correctly placed under the given categories?



Option	Present in the plant cells	Absent in the animal cells	Correct / Incorrect
(i)	 Leucoplast	 Cell wall	 Correct
(ii)	 Mitochondria	 Ribosome	 Incorrect
(iii)	 Cell wall	 Golgi apparatus	 Incorrect
(iv)	 Lysosome	 Endoplasmic reticulum	 Incorrect

EXPLANATION



-  **(i) Correct:** Leucoplasts and cell wall are present in plant cells but absent in animal cells.
-  **(ii) Incorrect:** Mitochondria and ribosomes are present in both plant and animal cells.
-  **(iii) Incorrect:** Cell wall is present in plant cells, but Golgi apparatus is present in both plant and animal cells.
-  **(iv) Incorrect:** Lysosomes and endoplasmic reticulum are present in animal cells (and also in plant cells).



 Therefore, the correct option is **(i)** only.



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- Two students, Renu and Rohit, were having a discussion on the plastids. Renu emphasised that all parts of the plants, even roots, contain plastids. However, Rohit did not agree with the statement and told her that plastids are absent in plant roots since the roots are underground and do not need to perform photosynthesis. Who is correct? Justify your answer.
- Mitochondria and chloroplasts are two important organelles in a plant cell. Discuss how these two organelles are structurally and functionally similar to each other, and different from each other.
- Which of the following pairs of cell organelles contains DNA?
 - Chloroplasts, Ribosomes
 - Mitochondria, Nucleus
 - Golgi bodies, Ribosomes
 - Nucleus, Lysosomes

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5 All parts of plants, even roots, contain plastids. Plastids are absent in plant roots since they are underground and do not need photosynthesis.

Two students, Renu and Rohit, were having a discussion on the plastids. Renu emphasised that all parts of the plants, even roots, contain plastids. However, Rohit did not agree with the statement and told her that plastids are absent in plant roots since the roots are underground and do not need to perform photosynthesis. Who is correct? Justify your answer.

ANSWER

Rohit is correct. Plastids (especially chloroplasts) are mainly present in green parts of the plant that are exposed to light and perform photosynthesis. Roots are underground, do not receive light and do not perform photosynthesis; therefore, plastids (chloroplasts) are generally absent in roots.

6 Mitochondria and chloroplasts are two important organelles in a plant cell. Discuss how these two organelles are structurally and functionally similar to each other, and different from each other.

Similarities	Differences (Structure)	Differences (Function)
<ul style="list-style-type: none"> Both are double-membraned organelles. Both have their own DNA and ribosomes. Both are semi-autonomous. Both are involved in energy transformations in the cell. 	<ul style="list-style-type: none"> Mitochondria: Inner membrane is folded into cristae. Chloroplasts: Inner membrane forms flat sacs called thylakoids, arranged in grana. 	<ul style="list-style-type: none"> Mitochondria: Site of cellular respiration; break down food to produce energy (ATP). Chloroplasts: Site of photosynthesis; use light energy to make food for the plant.

7 Which of the following pairs of cell organelles contains DNA?

(i) Chloroplasts, Ribosomes ✗ No	(ii) Mitochondria, Nucleus ✓ Yes	(iii) Golgi bodies, Ribosomes ✗ No	(iv) Nucleus, Lysosomes ✗ No
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Correct answer: (ii) Mitochondria, Nucleus

8. A researcher carried out an experiment in which she took two carrots of similar size. She placed one carrot in plain water and the other carrot in concentrated salt solution (Fig. 2.21). After 24 hours she recorded her observations.

- What hypothesis does she want to test through this experiment?
- What would you suggest for the improvement of this experiment?
- Why does the carrot in plain water stay stiff and crunchy, but the carrot in concentrated salt solution become rubbery and limp?

8

A researcher carried out an experiment in which she took two carrots of similar size. She placed one carrot in plain water and the other carrot in concentrated salt solution (Fig. 2.21). After 24 hours she recorded her observations.



(i) What hypothesis does she want to test through this experiment?



She wants to test the hypothesis that water moves in and out of plant cells (osmosis), and the amount of water in the surrounding solution affects the firmness of plant cells.



Hypothesis

If a carrot is placed in concentrated salt solution, it will lose water and become soft and limp.

(ii) What would you suggest for the improvement of this experiment?



- Use more than one pair of carrots and repeat the experiment.
- Measure and record the initial and final mass of the carrots.
- Use solutions of different salt concentrations to compare the effect.
- Keep other conditions constant (same size carrots, same time, same temperature).

(iii) Why does the carrot in plain water stay stiff and crunchy, but the carrot in concentrated salt solution become rubbery and limp?



Plain water

In plain water (hypotonic solution):

Water enters the carrot cells by osmosis. Cells become turgid (full of water), which keeps the carrot stiff and crunchy.

In concentrated salt solution (hypertonic solution):

Water moves out of the carrot cells by osmosis. Cells lose water and become flaccid, making the carrot rubbery and limp.



Concentrated salt solution



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9. Indicate the presence or absence of following structures in bacterial and animal cells:


Structures in a cell	Bacterial cell	Animal cell
Chromosome		
Nucleus		
Mitochondria		
Golgi complex		
Chromoplasts		



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9 Indicate the presence or absence of following structures in bacterial and animal cells:



Structures in a cell	Bacterial cell	Animal cell
 Chromosome	✓ Present	✓ Present
 Nucleus	✗ Absent	✓ Present
 Mitochondria	✗ Absent	✓ Present
 Golgi complex	✗ Absent	✓ Present
 Chromoplasts	✗ Absent	✗ Absent



 **Present:** The structure is found in that cell.
 **Absent:** The structure is not found in that cell.

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10. Carry out the following experiment:

Take four peeled potato halves and scoop each one out to make potato cups. One of these potato cups should be made from a boiled potato. Place each of the potato cups in a beaker containing water (Fig. 2.22). Now, set up the experiment as follows:

- (a) Keep Cup A empty.
- (b) Add one teaspoon sugar in Cup B.
- (c) Add one teaspoon salt in Cup C.
- (d) Add one teaspoon sugar in the boiled potato in Cup D.

Observe the four potato cups at least two hours and answer the following questions:

- (i) Explain why water gathers in the hollowed portion of Cup B and Cup C.
- (ii) Why is Cup A necessary for this experiment?
- (iii) Explain why water does not gather in the hollowed portions of Cups A and D.

10

Carry out the following experiment:

Take four peeled potato halves and scoop each one out to make potato cups. One of these potato cups should be made from a boiled potato. Place each of the potato cups in a beaker containing water (Fig. 2.22). Now, set up the experiment as follows:

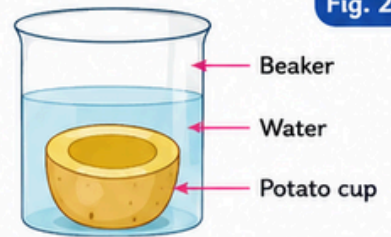


Fig. 2.22

(a) Cup A Empty	(b) Cup B + 1 teaspoon sugar	(c) Cup C + 1 teaspoon salt	(d) Cup D (boiled potato) + 1 teaspoon sugar
Keep Cup A empty.	Add one teaspoon sugar in Cup B.	Add one teaspoon salt in Cup C.	Add one teaspoon sugar in the boiled potato in Cup D.



Observe the four potato cups at least **two hours**.

(i) Explain why water gathers in the hollowed portion of Cup B and Cup C.



In Cup B (sugar), the solution inside the potato cup is more concentrated (hypertonic) than the surrounding water. So, water moves from the surrounding water (higher water potential) into the potato cup by **osmosis**, and collects there.

In Cup C (salt), the solution inside is also more concentrated (hypertonic) than the surrounding water. Hence, water again moves into the potato cup by osmosis and gathers in the hollowed portion.

Key idea

Water always moves by **osmosis** from a region of **higher water potential** (dilute solution) to **lower water potential** (concentrated solution).

(ii) Why is Cup A necessary for this experiment?

Cup A is the control. It helps us compare and confirm that any water collected in the other cups is due to the effect of sugar or salt (concentration) and not due to any other factor. It shows the normal condition when no solute is added.



(iii) Explain why water does not gather in the hollowed portions of Cups A and D.

- Cup A (empty): There is no difference in concentration between the potato cells and the surrounding water. Hence, no osmosis occurs (or water moves in and out equally), so no water collects in the hollowed portion.
- Cup D (boiled potato + sugar): Boiling destroys the **semipermeable membranes** of the potato cells. Therefore, **osmosis cannot occur**, and water does not collect in the hollowed portion even though sugar is added.









11. Identify the pair that incorrectly matches the cell organelle with its function.

- (i) Ribosome — Protein synthesis
- (ii) SER — Lipid and cellulose synthesis
- (iii) Lysosome — Digestion of foreign agents

11. Identify the pair that incorrectly matches the cell organelle with its function.

ANSWER

Option	Pair (Organelle — Function)	Correct / Incorrect	Explanation
(i)	 Ribosome — Protein synthesis	 Correct	Ribosomes are the site of protein synthesis.
(ii)	 SER — Lipid and cellulose synthesis	 Incorrect	SER synthesizes lipids (steroids, phospholipids), NOT cellulose. Cellulose is synthesized by the cell wall.
(iii)	 Lysosome — Digestion of foreign agents	 Correct	Lysosomes contain enzymes that digest foreign particles and worn-out cell parts.



Therefore, the incorrect pair is **(ii) SER — Lipid and cellulose synthesis.**



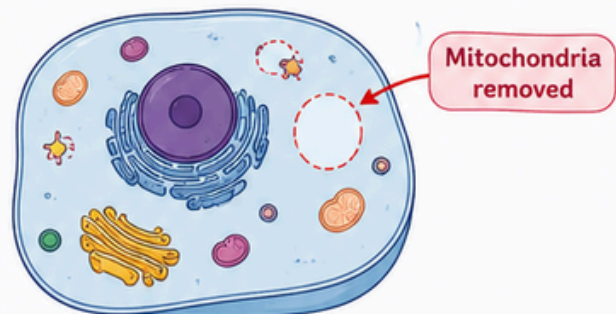
12. What outcome do you expect, if all the mitochondria are removed from a eukaryotic cell?


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 **ANSWER**

If all mitochondria are removed from a eukaryotic cell, the cell will not be able to produce energy (ATP) by cellular respiration. As a result:

- ★ The cell's activities will eventually stop.
- ★ Active transport will cease.
- ★ Protein synthesis and other energy-dependent processes will fail.
- ★ Eventually, the cell will die.



 Mitochondria are the “powerhouses” of the cell, essential for energy production.

13. Which phenomenon inhibits the formation of tumors in the human body? Can plants also develop tumors? Explain.

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ANSWER

In humans:

The phenomenon is contact inhibition. When cells touch each other, they stop dividing. This prevents uncontrolled cell division and inhibits the formation of tumors.



In plants:

Plants generally do not develop tumors because their cells are totipotent (they can become any type of cell and are not permanently fixed). Any abnormal cell growth is usually controlled by the plant's regulatory mechanisms and cell wall, which prevents uncontrolled growth.



So, contact inhibition prevents tumors in humans.

Plants usually do not develop true tumors due to their totipotent cells and strong cell wall.



14. The cell membrane of a cell is made up of proteins and lipids. Which cell organelles help in the synthesis of cell membrane? Write the path of these compounds from their site of synthesis to the cell membrane and show this through a labelled diagram.

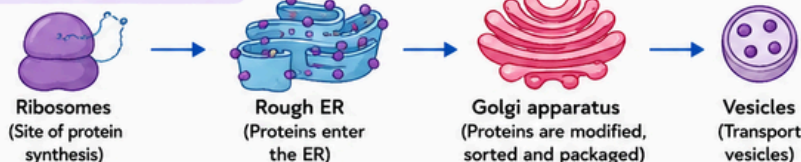
14. The cell membrane of a cell is made up of proteins and lipids. Which cell organelles help in the synthesis of cell membrane? Write the path of these compounds from their site of synthesis to the cell membrane and show this through a labelled diagram.

ANSWER

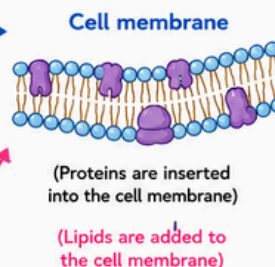
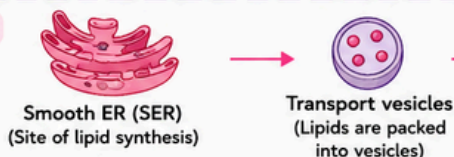
The cell membrane is made of **proteins** and **lipids**. Ribosomes help in the synthesis of **proteins** and Smooth Endoplasmic Reticulum (**SER**) helps in the synthesis of **lipids**.

PATH OF PROTEINS AND LIPIDS TO CELL MEMBRANE

PROTEIN PATHWAY



LIPID PATHWAY



KEY

- Proteins
- Lipids
- Path of proteins
- Path of lipids

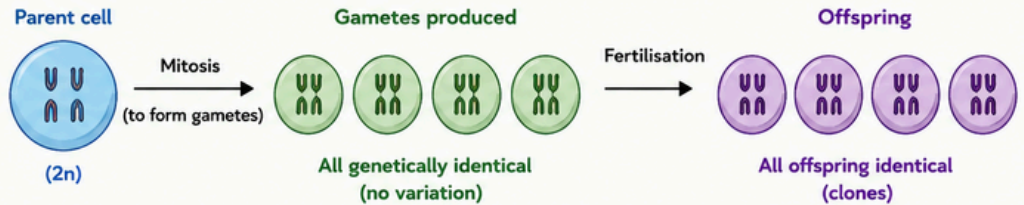
15. What would happen if gametes are formed by mitotic divisions?

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ANSWER

If gametes are formed by mitotic divisions, they will be **genetically identical** to the parent and to each other.

When such gametes fuse during fertilisation, no variation will occur in the offspring. As a result, **all offspring will be identical clones of the parents.**



Conclusion

No genetic variation; all offspring are identical clones, which is harmful for the survival of a species as they cannot adapt to changes in the environment.



16. A farmer, Deepa, was very happy with the harvest of *amla* (Indian Gooseberry) and lemons on her farm. However, she could sell only one-fourth of the produce in the local market. Recognising that a significant amount of produce may be lost post-harvest, she employed a traditional yet scientifically sound method to extend the shelf life of *amla* and lemons. She turned perishable produce into profitable products, such as pickles and *sharbat*. She used the excess produce to prepare pickles, *murabbas*, and *sharbat* by adding appropriate amounts of salt, sugar, or jaggery to small pieces of fruit and their juices. These were then stored in small glass bottles for sale, helping her prevent the wastage of post-harvest produce. This shift from farming to agro-processing would strengthen food security and boost the local economy, creating a sustainable model that cuts waste while increasing her income. Based on the above passage answer the following questions:

- Which scientific concept has the farmer applied in the preservation of the farm produce?
- How does the addition of high concentrations of salt and sugar create an environment that prevents the growth of spoilage-causing bacteria and fungi?
- Suggest a healthy recipe of this kind for food preservation.
- What are the scientific values addressed in this case?

16.

A farmer, Deepa, was very happy with the harvest of *amla* (Indian Gooseberry) and lemons on her farm. However, she could sell only one-fourth of the produce in the local market. Recognising that a significant amount of produce may be lost post-harvest, she employed a traditional yet scientifically sound method to extend the shelf life of *amla* and lemons. She turned perishable produce into profitable products, such as pickles and sharbat...

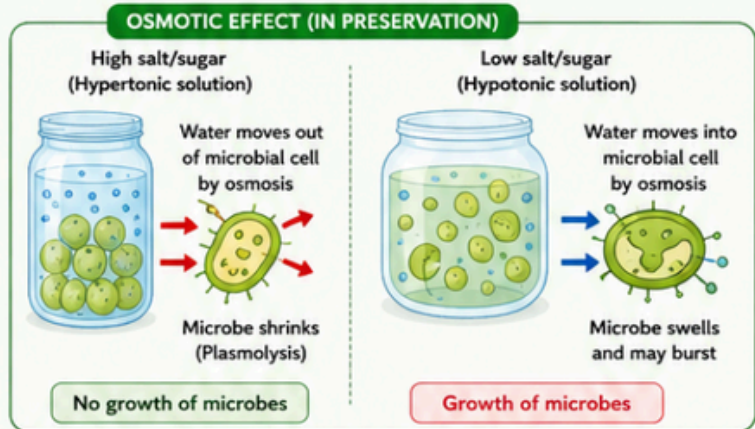


(i) Which scientific concept has the farmer applied in the preservation of the farm produce?

ANSWER

The farmer has applied the concept of **preservation by osmotic effect**.

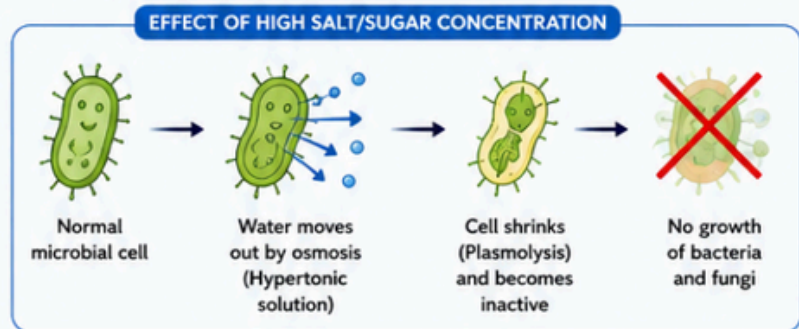
By adding high amounts of salt, sugar, or jaggery, she created a hypertonic environment in the fruit products (pickles, murabbas, sharbat). This prevents the growth of spoilage-causing microorganisms and increases the shelf life of the products.



(ii) How does the addition of high concentrations of salt and sugar create an environment that prevents the growth of spoilage-causing bacteria and fungi?

ANSWER ✓

- High concentrations of salt or sugar make the solution **hypertonic**.
- Water moves out of the microbial cells by **osmosis**.
- Microbial cells lose water, shrink (**plasmolysis**), and become inactive.
- Without water, microbes cannot grow, reproduce, or cause spoilage.
- Hence, the food remains safe and lasts longer.



(iii) Suggest a healthy recipe of this kind for food preservation.

ANSWER

Amla Murabba (Healthy Recipe)

Ingredients:

- Amla – 500 g
- Jaggery – 500 g
- Water – 1 cup
- Cardamom powder – ½ tsp (optional)



Method:

- 1 Wash amlas, prick lightly and steam/boil until soft. Cool and remove seeds.
- 2 Make a thick jaggery syrup with water and strain it.
- 3 Add amlas to the warm syrup and keep aside for 24 hours.
- 4 Cook again until the syrup thickens.
- 5 Cool and store in a clean, dry glass jar.

Why it is healthy:

- ✓ Uses jaggery (natural sweetener).
- ✓ No artificial preservatives.
- ✓ Rich in Vitamin C and antioxidants.
- ✓ Good for immunity and digestion.



This method uses natural sweetness and osmotic effect to preserve food safely.

(iv) What are the scientific values addressed in this case?

ANSWER


Scientific temperament
Deepa used a traditional method based on scientific principles (osmosis).


Resourcefulness and Innovation
She converted surplus produce into value-added products.


Sustainability and Conservation
She reduced food wastage and used natural preservatives.


Economic Responsibility
She increased her income and supported the local economy.


Health and Food Safety
She ensured safe, healthy food without harmful chemicals.



Deepa's approach is a perfect example of applying scientific knowledge for a healthy, sustainable, and prosperous life.

