5. Study of cells

Exercises

1 A. Question

A cell lacking in the nucleus also lacks

A. plasma membrane

B. mitochondria

C. chromosome

D. vacuole

Answer

Mitochondria are membrane-bound organelles that pproduce energy for the cell. A cell which lacks nucleus also lacks all other membrane-bound organelles. Their genetic material is naked lying in the cytoplasm. These are called **prokaryotic** cells.

1 B. Question

Cell wall is absent in the cell of this organism

A. mushroom

B. moss

C. fern

D. mosquito

Answer

Presence of a cell wall is a characteristic feature of plants. Cell wall provides them rigidity. Moss and fern are plants, therefore consists of a cell wall. Mushroom is a fungus. Fungi also possess a cell wall made of chitin. Animal cells completely lack cell walls.

1 C. Question

Organelle of the cell which releases energy through respiration is

A. Golgi complex

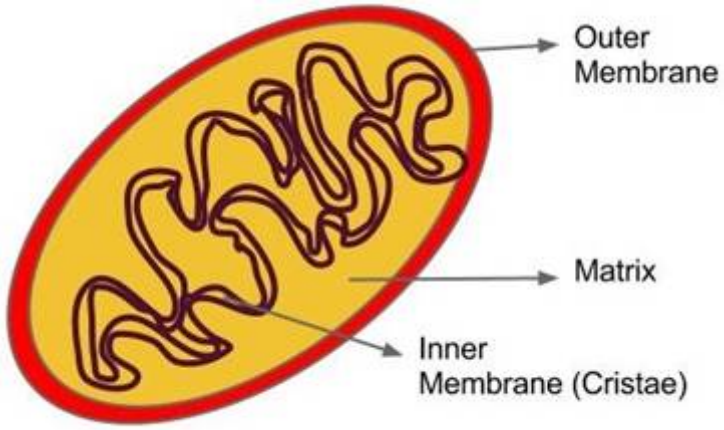
B. mitochondrion

C. lysosome

D. chloroplast

Answer

Mitochondria are known as the powerhouse of the cell as they produce energy in the form of ATP for the cells through cellular respiration.The structure of mitochondria is given below:



A Mitochondria

1 D. Question

Which one of the following part of a cell is non-living?

A. Cell wall

B. Mitochondria

C. Cell membrane

D. Lysosome

Answer

The cell wall is present in plant cells but not in animal cells. The function of the cell wall is to provide mechanical support and strength. It is a non-living rigid coat present around the cell.

1 E. Question

One of the following is the smallest organelle in a cell

A. Lysosome

B. Nucleus

C. Ribosome

D. Mitochondria

Answer

Ribosomes are non-membrane bound organelles. They are the smallest organelles present in a cell which are responsible for protein synthesis.

2. Question

Fill in the blanks with suitable words:

1. The instrument that led to the understanding of the cell is _____.

2. The organelle which controls the various activities of the cell is____.

3. The organelle which is called the 'kitchen of the plant cell' is ____ .

4. The site of protein synthesis in the cell is _____.

5. The main chemical component of the cell wall is _____.

Answer

1. The instrument that led to the understanding of the cell is a microscope.

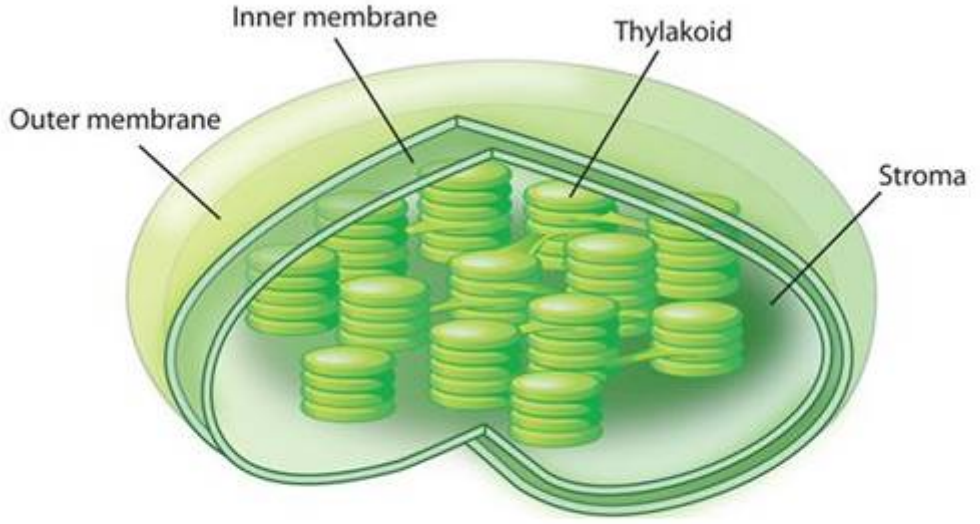
The microscope was designed by Robert Hooke who observed cork cells.

2. The organelle which controls the various activities of the cell is the nucleus.

The nucleus is called the **command center** of the cell. It contains the genetic material and controls all the activities of the cell.

3. The organelle which is called the 'kitchen of the plant cell' is chloroplast.

The chloroplast is a plastid that is covered by two membranes. It contains green pigment **chlorophyll** that is needed by the plant to make food through photosynthesis.



The chloroplast makes food for the plant cell.

4. The site of protein synthesis in the cell is the ribosome.

Ribosomes are non-membrane bound organelles which are responsible for protein synthesis. They are also called as **protein factory** of the cell.

5. The main chemical component of the cell wall is cellulose.

The plant cell wall is made of cellulose (carbohydrate). It is the most abundant macromolecule on earth.

3. Question

Match the following:

A	B
1. storage room of the cell	a. chloroplast
2. gateway of the cell	b. Golgi complex
3. solar panels of the cell	c. vacuole
4. packages of hereditary information	d. nucleus
	e. chromoplast
	f. cell membrane
	g. chromosome

Answer

1. Storage room of the cell – vacuole

Vacuoles present in plant cells store food, water, gas, waste materials, etc.

2. Gateway of the cell-cell membrane

The cell membrane is a semi-permeable membrane that allows only selective substances to pass through it.

3. Solar panels of the cell – chloroplast

Chloroplasts are a type of plastids that contain green pigment **chlorophyll** that traps the solar energy and help the plant to make food through photosynthesis.

4. Packages of hereditary information – chromosome

Chromosomes are thread-like structures that contain the genetic information in the form of genes. They are usually present in the nucleus.

4 A. Question

Answer the following questions:

What are genes? Mention their importance.

Answer

Gene is the functional unit of hereditary. It carries genetic information in the form of DNA. The physical appearance (phenotype) of an organism is determined by its genes and the information that they carry. DNA has a specific sequence that is responsible for making different proteins. It is through genes that the characteristics of parents pass on to their offspring. They help in the transmission of characters.

4 B. Question

Answer the following questions:

Which organelle in an animal cell is useful during cell division?

Answer

In animal cells, centriole helps in the cell division. A centriole is a tiny cylindrical organelle present near the nucleus in a pair. It forms the spindle fibers and organises microtubules that separates the chromosomes during cell division. The fibers pull the chromosomes apart towards the opposite poles.

4 C. Question

Answer the following questions:

What is the role of chloroplast in a plant cell?

Answer

The chloroplast is a type of plastid-containing green pigment chlorophyll inside it. It is bound by two membranes. Chloroplasts are responsible for trapping and converting light energy from the sun into chemical energy and form sugar (glucose). These organelles are essential to carry out photosynthesis.

4 D. Question

Answer the following questions:

Which are the organelles that are found more in number in the following cells?

a. muscle cells

b. white blood cells

c. leaf cells

d. pancreatic cells

Answer

a. Muscle cells – Mitochondria as they need more energy.

b. White blood cells – Lysosome as WBCs are involved in the defense system of the body.

c. Leaf cells – Chloroplasts as they synthesize food for the plant.

d. Pancreatic cells – Ribosomes which are actively involved in protein synthesis.

4 E. Question

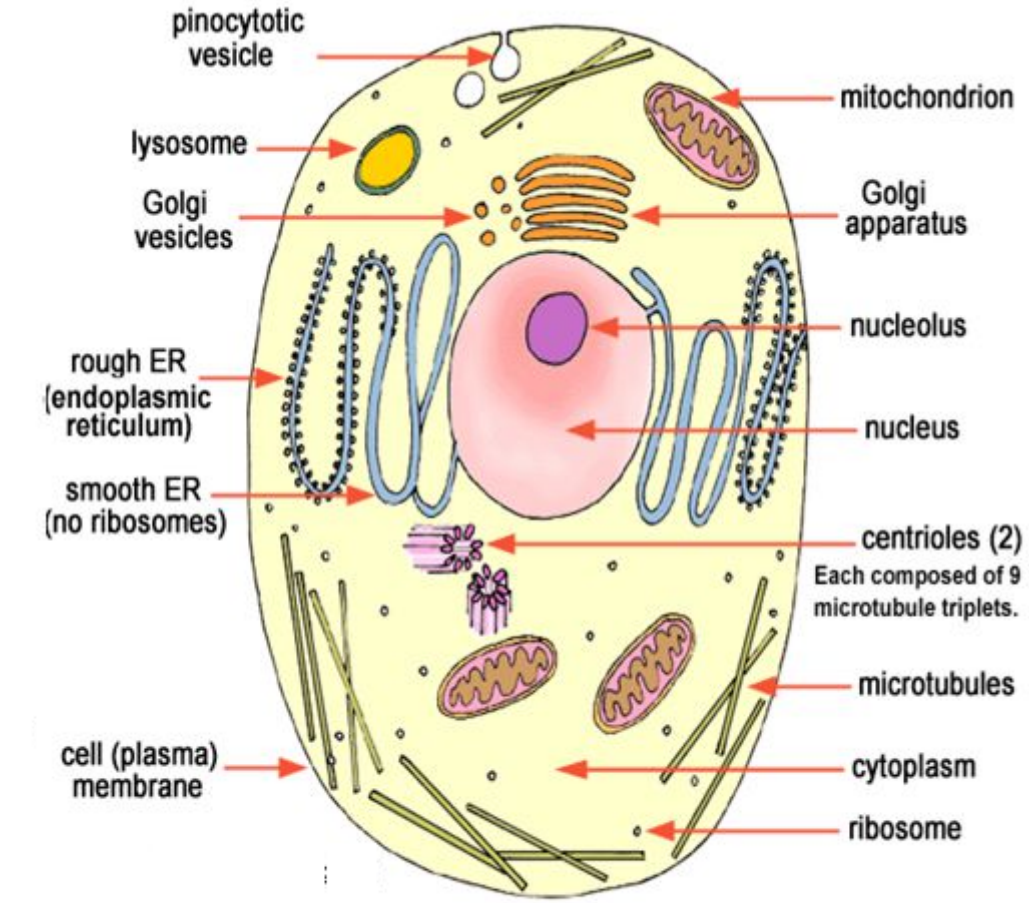
Answer the following questions:

List any four differences between a plant cell and an animal cell.

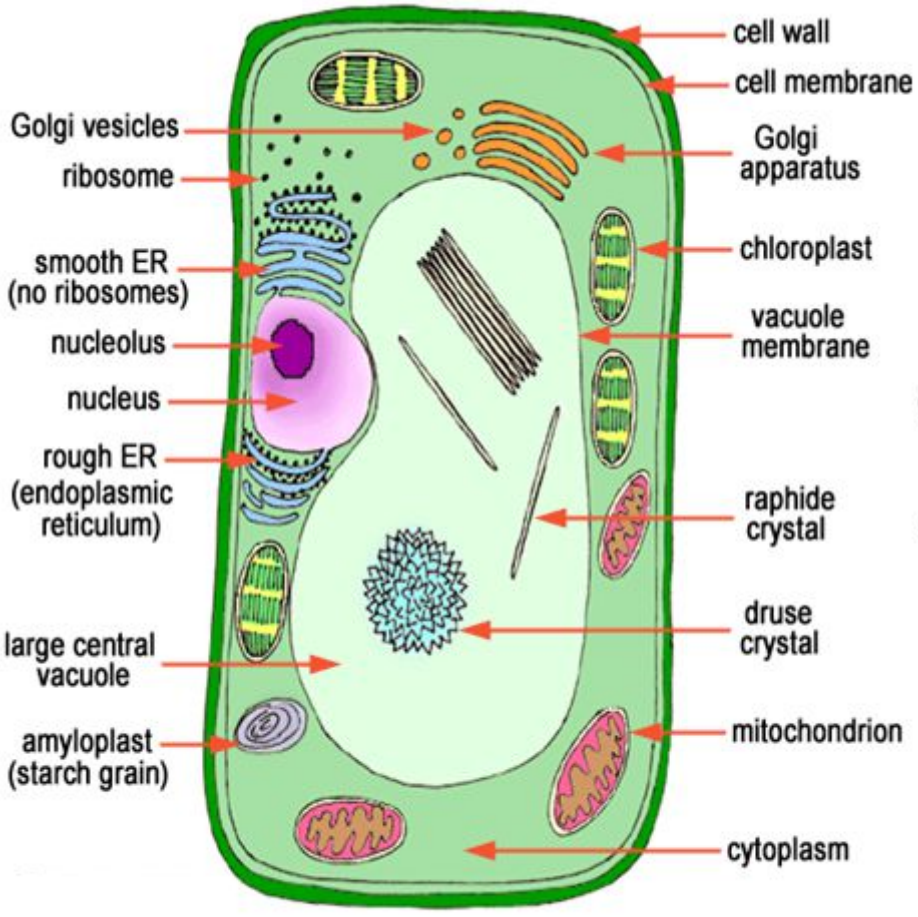
Answer

Plant cell	Animal cell
1. A plant cell is usually large.	1. Animal cell is comparatively small in size.
2. The cell wall is present.	2. The cell wall is absent.
3. Chloroplasts (plastids) are present.	3. Plastids are absent.
4. Nucleus is peripheral (lies on one side).	4. The nucleus is present in the center.
5. Centrioles are absent.	5. Centrioles are present.

The animal and plant cel are given below:



Animal Cell



Plant Cell

4 F. Question

Answer the following questions:

What happens when an empty potato cup is kept in a trough with water? Why?

Answer

Water gets collected in the hollow cup. As a result of **osmosis**, water enters inside. Since the medium surrounding the potato cup has a higher concentration of water than the potato, the water molecules move in. The water molecules move along the concentration gradient from a region of higher concentration to a region of lower concentration.

4 G. Question

Answer the following questions:

0.9% sodium chloride solution is good and balanced to RBC. A lab technician accidentally places a sample of RBC's in 1.8% sodium chloride solution. What happens? Why?

Answer

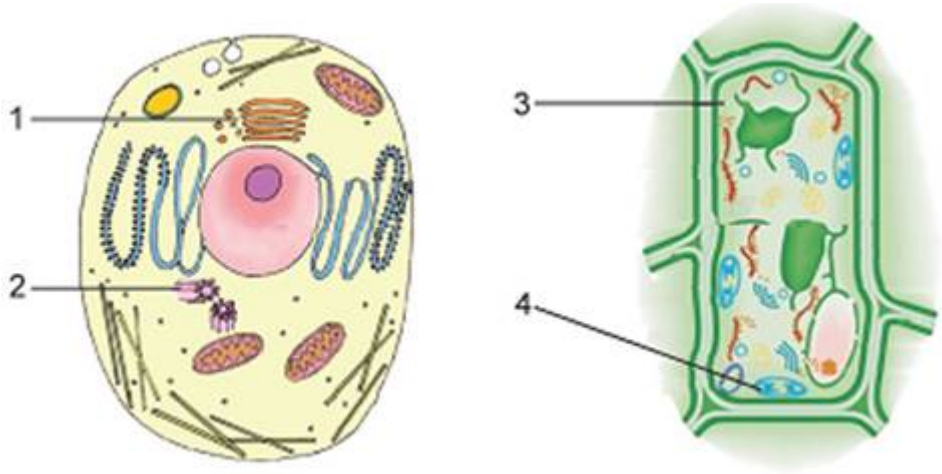
0.9% NaCl solution is **isotonic** with blood. The cells remain unaffected in isotonic solution as they both have equal concentration of solute. 0.9% NaCl solution is good and balanced to RBC.

But when placed in a 1.8% NaCl solution, the RBC shrinks. This happened because 1.8% is **hypertonic** to RBC. The surrounding hypertonic solution has a higher concentration of solute than the RBC. So water moves out from the RBC along the concentration gradient. As a result, RBC loses water and shrinks.

4 H. Question

Answer the following questions:

Diagrams of two different cells are given below. Which one of the two is a plant cell? Support your answer.



(i) Name the parts 1, 2, 3 and 4.

(ii) Write the functions of 1 and 3.

(iii) Draw a diagram to show the structure of 4 and label the parts.

(iv) Draw a diagram of a plant cell and label the parts.

Answer

The diagram on the right depicts a plant cell as it possesses a cell wall. The nucleus is also peripheral.

(i) Part 1 – Endoplasmic reticulum

Part 2 – centriole

Part 3 – vacuole

Part 4 – chloroplast

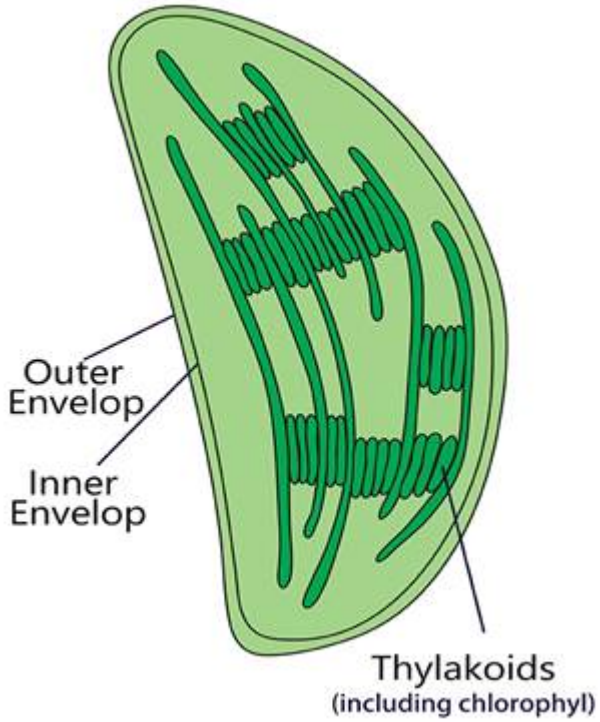
(ii) The function of ER:

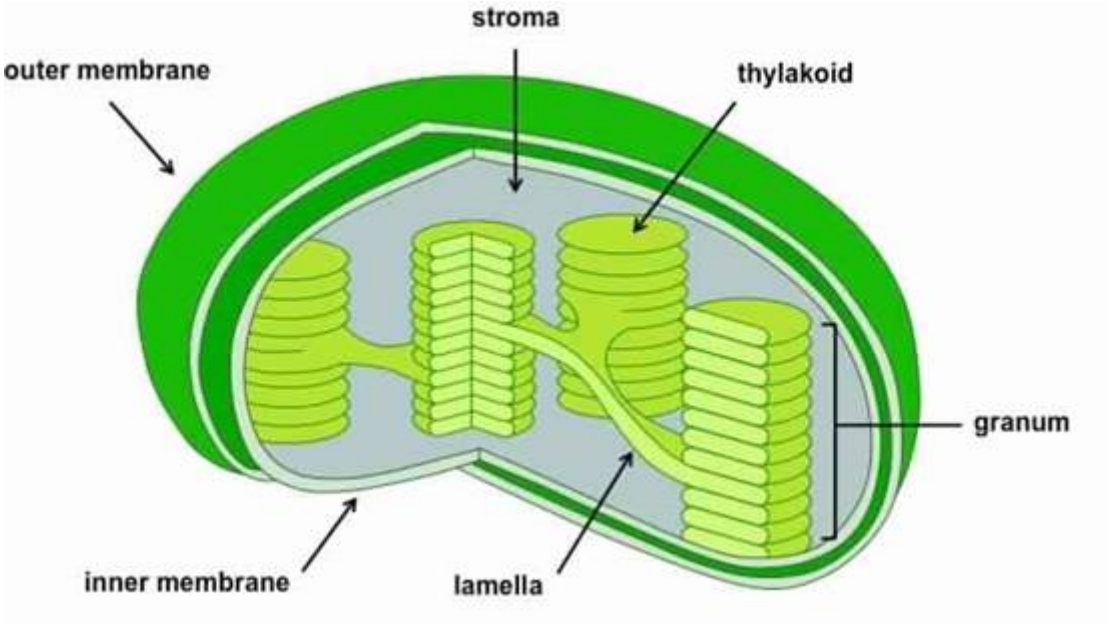
Endoplasmic reticulum forms a network of tube-like structures near the nucleus. It is responsible for folding of protein molecules and transporting various synthesized molecules (protein and carbohydrate) to the Golgi body and lysosome.

The function of vacuole:

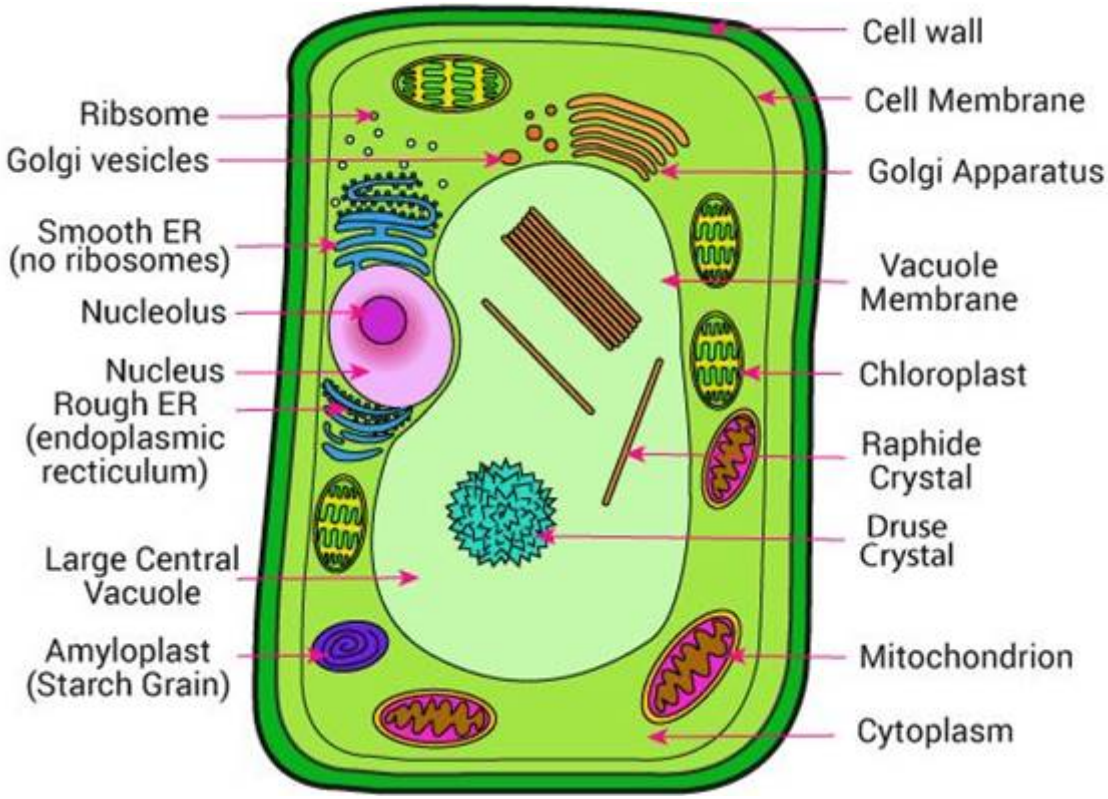
Vacuole serves as a storage organelle. It is usually the largest organelle in a plant cell. It stores various food particles, excess water, and waste products. In addition, it also maintains pressure within the cell and provides structural support to the cell.

(iii) Diagram of chloroplast:





(iv) Plant cell



5 A. Question

Suggested Activities

Put dried raisins (dry grapes) in a dish with water. What is the change in the raisins after some time? Why?

Answer

When dried raisins are put in water, they will swell up due to entry of water inside them. As a result of **osmosis**, raisins absorb water. Since the medium surrounding the raisins has a higher concentration of water, the water molecules move in. The surrounding solution is **hypotonic.** The water molecules move along the concentration gradient from a region of higher concentration to a region of lower concentration.

SWELLED UP RAISINS

5 B. Question

Suggested Activities

Remove the shell of an egg by dissolving it in dilute hydrochloric acid. A thin outer skin now encloses the egg. Put the egg in water. Observe after a few minutes. What is your inference?

Answer

The shell of an egg is basically calcium carbonate. So when it is placed in dilute HCl, the shell dissolves. Now the inner thin covering is exposed which acts as a semi-permeable membrane.

When this de-shelled egg is placed in water, it swells up. Water molecules move inside as a result of **osmosis** to maintain equilibrium. The surrounding medium has a higher concentration of water than that present in the egg. The surrounding solution is hypotonic. The water molecules move along the concentration gradient from a region of higher concentration to a region of lower concentration.

DE-SHELLED EGG

5 C. Question

Suggested Activities

Place a similar de-shelled egg in a concentrated salt solution for a few minutes. Observe the changes. Record your observations giving reasons.

Answer

When a similar de-shelled egg is placed in concentrated salt solution for a few minutes, it shrinks in size. Again due to **osmosis**, water molecules diffuse out across the semi-permeable to maintain equilibrium. The surrounding salt solution is **hypertonic**; it has a lower concentration of water, so to maintain equal concentration, water moves out from the egg along the concentration gradient. Thus, egg loses water and shrinks.