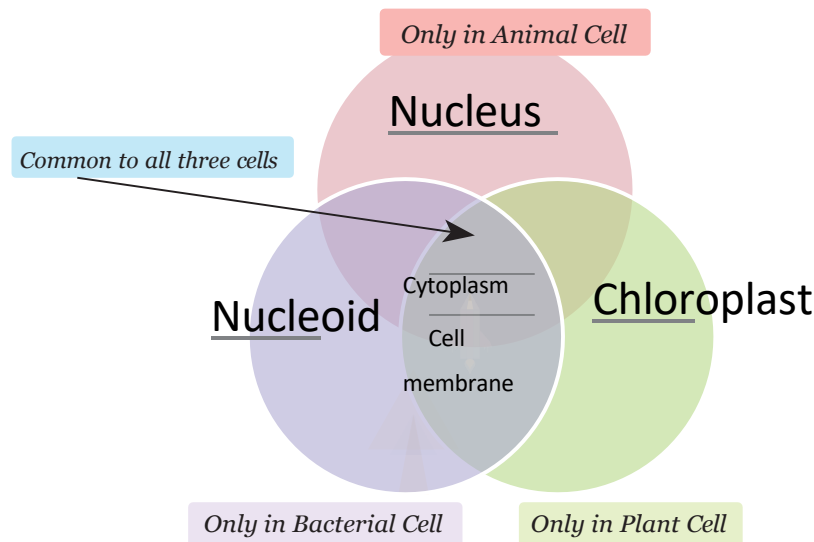


2

The Invisible Living World: Beyond Our Naked Eye

Textbook Questions & Answers

1. Various parts of a cell are given below. Write them in the appropriate places in the following diagram.



2. Aanandi took two test tubes and marked them A and B. She put two spoon full of sugar solution in each of the test tubes. In test tube B, she added a spoonful of yeast. Then she attached two incompletely inflated balloons to the mouth of each test tube. She kept the set-up in a warm place, away from sunlight.

(i) What do you predict will happen after 3–4 days? She observed that the balloon attached to test tube B was inflated. What can be a possible explanation for this?

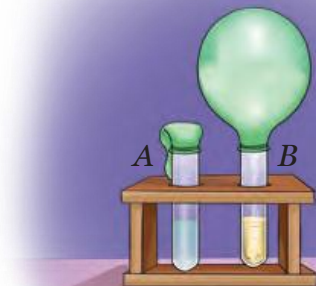
(a) Water evaporated in test tube B and filled the balloon with the water vapour.

(b) The warm atmosphere expanded the air inside the test tube B, which inflated the balloon.

(c) Yeast produced a gas inside the test tube B which inflated the balloon.

(d) Sugar reacted with warm air, which produced gas, eventually inflating the balloon.

(ii) She took another test tube, 1/4 filled with lime water. She removed the balloon from test tube B in such a manner that the gas inside the balloon did not escape. She attached the balloon to the test tube with lime water and shook it well. What do you think she wants to find out?



Ans:

(i) **Correct Option:** (c) Yeast produced a gas inside the test tube B which inflated the balloon.

(ii) She wants to check whether the gas produced by yeast is carbon dioxide by passing it through lime water, which turns milky in presence of CO₂.

3. A farmer was planting wheat crops in his field. He added nitrogen-rich fertiliser to the soil to get a good yield of crops. In the neighbouring field, another farmer was growing bean crops, but she preferred not to add nitrogen fertilizer to get healthy crops. Can you think of the reasons?

Ans: The farmer growing bean crops **did not need to add nitrogen-rich fertiliser** because bean plants belong to the legume family, which naturally fixes nitrogen in the soil with the help of a type of beneficial bacteria called *Rhizobium*.

Rhizobium bacteria live in the root nodules of **leguminous plants** (like beans, peas, lentils) and convert nitrogen from the air into a form that plants can absorb and use. This **natural nitrogen fixation** improves soil fertility and provides enough nitrogen for the bean plants to grow healthily without the need for artificial fertilisers.

In contrast, **wheat plants do not have this ability**, so the farmer growing wheat had to add nitrogen-rich fertiliser to the soil to ensure good crop yield.

4. Snehal dug two pits, A and B, in her garden. In pit A, she put fruit and vegetable peels and mixed it with dried leaves. In pit B, she dumped the same kind of waste without mixing it with dried leaves. She covered both the pits with soil and observed after 3 weeks. What is she trying to test?

Ans: Snehal is trying to test the role of dried leaves (carbon-rich material) in the composting process.

In pit A, the mixture of fruit and vegetable peels (rich in nitrogen) with dried leaves (rich in carbon) creates a balanced environment that supports the growth of microorganisms which break down the waste effectively and turn it into manure.

In pit B, where dried leaves were not added, the lack of carbon-rich material may slow down or hinder decomposition.

By comparing the results in both pits after 3 weeks, Snehal can observe how the presence or absence of dried leaves affects the rate and quality of compost formation.

5. Identify the following microorganisms:

- (i) I live in every kind of environment, and inside yoghurt. -- **Bacteria**
- (ii) I make bread and cakes soft and fluffy. -- **Yeast**
- (iii) I live in the roots of pulse crops and provide nutrients for their growth. -- **Rhizobium**

6. Devise an experiment to test that microorganisms need optimal temperature, air, and moisture for their growth.

Ans: Experiment to Test Conditions for Microbial Growth

Materials Required:

4 slices of bread, 4 clean, transparent plastic or zip-lock bags, Water, Labels (A, B, C, D)

Steps:

Label the bread slices:

- Slice A: Keep dry and place it in a warm place.
- Slice B: Slightly sprinkle with water (moist) and place in a warm place.
- Slice C: Slightly sprinkle with water (moist) and place in a cold place (like refrigerator).
- Slice D: Completely seal in an air-tight bag with a few drops of water and place in a warm place.

Observation:

Leave all slices undisturbed for 3–5 days.

Record the growth of mould (fungus) or any microbial activity (like smell, discoloration) on each slice.

Experiment to Test Conditions for Microbial Growth

MATERIALS REQUIRED



4 slices of bread



4 clean, transparent plastic bags



Water

A B
C D

Labels (A, B, C, D)

STEPS

A (Dry, Warm, with Air)

B (Moist, Warm, with Air)

C (Moist, Cold, with Air)

D (Moist, Warm, No Air)

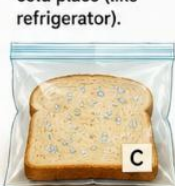
Keep dry and place it in a warm place.



Slightly sprinkle with water (moist) and place in a warm place.



Slightly sprinkle with water (moist) and place in a cold place (like refrigerator).



Completely seal in an air-tight bag with a few drops of water and place in a warm place.



OBSERVATION

Leave all slices undisturbed for 3–5 days. Record the growth of mould (fungus) or any microbial activity (like smell, discoloration) on each slice.

A (Dry, Warm, with Air)

B (Moist, Warm, with Air)

C (Moist, Cold, with Air)

D (Moist, Warm, No Air)






CONCLUSION

This experiment shows that microorganisms grow best when all three conditions — warmth, moisture, and air — are present. Their growth slows down or stops when one or more of these conditions are not available.

Ideal conditions for microbial growth

 +  + 

Warmth Moisture Air

Expected Results:

- Slice B (moist, warm, with air) will show maximum microbial growth.
- Slice A (dry) will show little or no growth.
- Slice C (cold) will show slow or no growth.
- Slice D (sealed with no air) will show reduced or no growth.

Conclusion:

This experiment shows that microorganisms grow best when all three conditions — warmth, moisture, and air — are present. Their growth slows down or stops when one or more of these conditions are not available.

7. Take 2 slices of bread. Place one slice in a plate near the sink. Place the other slice in the refrigerator. Compare after three days. Note your observations. Give reasons for your observations.

Ans: Observation:

- The bread slice placed near the sink shows signs of mould growth after three days. It may appear green, black, or white in patches and might smell bad.
- The bread slice kept in the refrigerator shows little or no mould growth.



Reason:

- The area near the sink is warm and humid, which provides ideal conditions (warmth, moisture, and air) for the growth of microorganisms such as mould.
- The refrigerator has a cold and dry environment, which slows down or prevents microbial growth.

Conclusion:

- Microorganisms like mould grow faster in warm, moist conditions and grow very slowly or not at all in cold environments like a refrigerator.

8. A student observes that when curd is left out for a day, it becomes more sour. What can be two possible explanations for this observation?

Ans:

Increased Growth of Bacteria:

- The curd contains *Lactobacillus* bacteria, which multiply more rapidly at room temperature.
- These bacteria break down the milk sugar (lactose) into lactic acid, making the curd more sour.

Longer Fermentation Time:

- Leaving curd outside for a longer time allows the fermentation process to continue.
- As more lactic acid is produced over time, the acidity of the curd increases, resulting in a sharper sour taste.

9. Observe the set-up given in Fig. 2.15 and answer the following questions.

- What happens to the sugar solution in flask A?
- What do you observe in test tube B after four hours? Why do you think this happened?
- What would happen if yeast was not added in flask A?

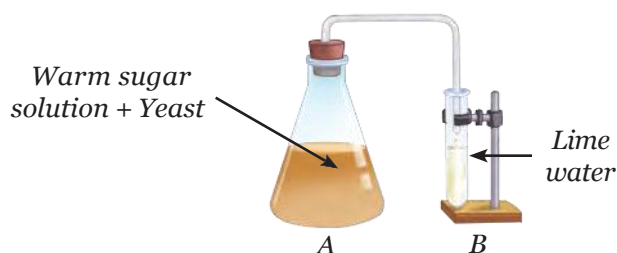


Fig. 2.15 : Experimental set-up

Ans:

(i) What happens to the sugar solution in flask A?

- The yeast ferments the sugar in the warm solution.
- During this fermentation process, yeast breaks down sugar and releases carbon dioxide (CO₂) gas.

(ii) What do you observe in test tube B after four hours? Why do you think this happened?

- The lime water in test tube B turns milky.
- This happens because the carbon dioxide gas produced by yeast in flask A passes into the lime water, forming calcium carbonate, which causes the milky appearance.

Reaction:

(iii) What would happen if yeast was not added in flask A?

- No fermentation would occur, so no carbon dioxide would be produced.
- As a result, the lime water in test tube B would remain clear and not turn milky.