

Passive Cellular Transport Assignment – Teacher Edition

I. Modified True or False

Five sets of two statements (X and Y) are written below. Decide whether these statements are TRUE or FALSE. Select your answer based on the following options.

- A. Both Statement X and Statement Y are TRUE.
- B. Both Statement X and Statement Y are FALSE.
- C. Statement X is TRUE but Statement Y is FALSE.
- D. Statement X is FALSE but Statement Y is TRUE.

- _____ 1. X – In a hypertonic solution, the water concentration inside and outside the cell is the same
Y – A hypertonic solution would cause an animal cell to burst.
- _____ 2. X – Osmosis is a form of diffusion involving water.
Y – The cell membrane is partially permeable to water.
- _____ 3. X – Diffusion occurs because particles are always at rest.
Y – The total dispersion of particles in a solution is called its net movement.
- _____ 4. X – Facilitated diffusion involves the use of proteins embedded in the cell membrane.
Y – Glucose is transported inside the cell through simple diffusion.
- _____ 5. X – An animal cell in an isotonic solution will eventually die.
Y – An animal cell in a hypotonic solution will eventually die.

II. Matching terms and meanings

Match the term in **Column A** with the correct meaning or description in **Column B**.

Column A	Column B
_____ 1. lysis	A. Bursting of animal cell in a hypotonic solution
_____ 2. plasmolysis	B. Difference in the concentration
_____ 3. crenation	C. Shriveling of an animal cell
_____ 4. equilibrium	D. Shrinking of the cell membrane away from the cell wall in a plant cell
_____ 5. concentration gradient	E. Substance(s) dissolved in a solution
_____ 6. solute	F. The state where a solute is evenly distributed throughout the medium

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- III. An experiment was set up to test the hypothesis that increasing the temperature increases the rate of diffusion. The time (in seconds) for a purple dye to diffuse through set distances in water at different temperatures was recorded. The results are shown in the table below:

Water Temperature (°C)	2 cm	4 cm	6 cm	8 cm	10 cm
10	60	114	210	300	450
20	30	66	108	282	222
30	12	30	55	80	125

- a) Plot each of the three data sets on a graph.
- b) Label the axis with appropriate labels and units.
- c) State whether the hypothesis is correct. Explain your answer.

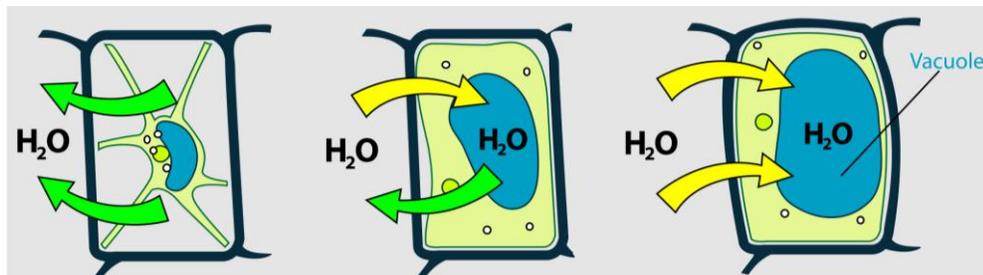
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IV. The image below shows red blood cells placed in three different solutions – hypotonic, hypertonic and isotonic.



- a) Label each sample of red blood cells with the terms hypotonic, hypertonic and isotonic to show the type of solution they have been placed in.
- b) Explain the effect of each type of solution on the red blood cells:
- Hypotonic:
 - Hypertonic:
 - Isotonic:

The same treatment was applied to three plant cells (shown in the diagrams below).



- c) For each plant cell, identify the type of solution has been placed in and the effect it has on the cell.
- d) Identify the type of solution that is best suited for both plant and animal cells. Give a reason for your answer.

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ANSWERS

I. Modified True or False

Five sets of two statements (X and Y) are written below. Decide whether these statements are TRUE or FALSE. Select your answer based on the following options.

- A. Both Statement X and Statement Y are TRUE.
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- D. Statement X is FALSE but Statement Y are TRUE.

1. **B** F X - In a hypertonic solution, the water concentration inside and outside the cell is the same.
F Y - A hypertonic solution would cause an animal cell to burst.
2. **C** T X – Osmosis is a form of diffusion involving water.
F Y – Cell Membrane is semipermeable to water.
3. **D** F X – Diffusion occurs because particles are always at rest.
T Y – The total dispersion of particles in a solution is called net movement.
4. **A** T X – Facilitated diffusion involves the use of protein helper in the cell membrane.
T Y – Glucose is transported inside the cell through facilitated diffusion.
5. **D** F X – An animal cell in an isotonic solution will eventually die.
T Y – An animal cell in a hypotonic solution will eventually die.

II. Matching Terms and meanings

Match the term in **Column A** to the most appropriate meaning or description in **Column B**.

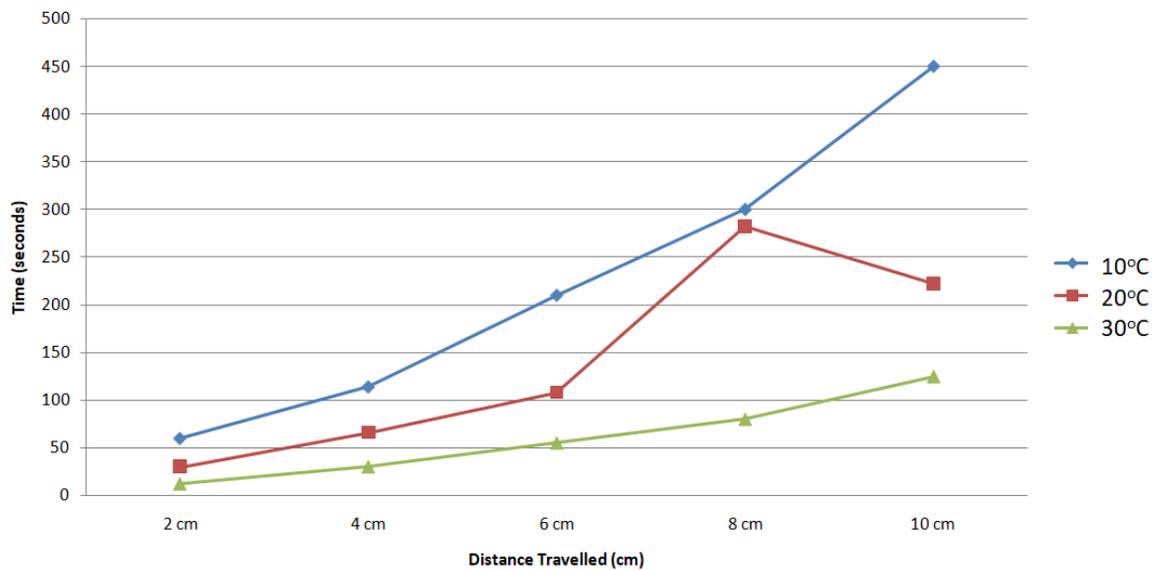
Column A	Column B
_____ 1. A lysis	A. Bursting of animal cell in a hypotonic solution
_____ 2. D plasmolysis	B. Difference in the concentration
_____ 3. C crenation	C. Shriveling of an animal cell
_____ 4. F equilibrium	D. Shrinking of the cell membrane away from the cell wall in a plant cell
_____ 5. B concentration gradient	E. Substance(s) dissolved in a solution
_____ 6. E solute	F. The state where a solute is evenly distributed throughout the medium

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- V. An experiment was set up to test the hypothesis that increasing the temperature increases the rate of diffusion. The time (in seconds) for a purple dye to diffuse through set distances in water at different temperatures was recorded. The results are shown in the table below:

Water Temperature (°C)	2 cm	4 cm	6 cm	8 cm	10 cm
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30	12	30	55	80	125

- a) Plot each of the three data sets on a graph.



- b) Label the axis with appropriate labels and units.

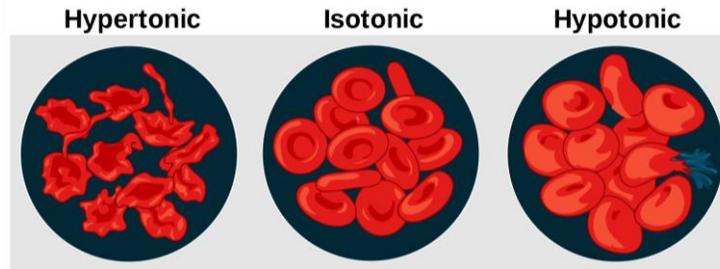
See graph

- c) State whether the hypothesis is correct. Explain your answer.

Yes, the higher the temperature, the greater the distance the dye diffused

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VI. The image below shows red blood cells placed in three different solutions – hypotonic, hypertonic and isotonic.



a) Label each sample of red blood cells with the terms hypotonic, hypertonic and isotonic to show the type of solution they have been placed in.

b) Explain the effect of each type of solution on the red blood cells:

- Hypotonic:

In a hypotonic solution the concentration of water is higher outside the cell than inside the cell. This means that water moves into the cell causing it to swell and eventually lyse or burst as it lacks a cell wall to support the membrane.

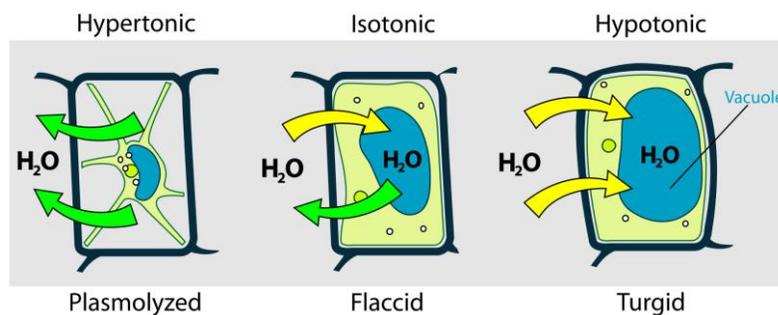
- Hypertonic:

In a hypertonic solution the concentration of water is higher inside the cell than outside the cell. This means that water moves out of the cell causing it to shrivel and crenate.

- Isotonic:

In an isotonic solution the concentration is the same outside the cell as it is inside the cell. This means that water moves into and out of the cell at the same rate and there is no change in shape or appearance.

The same treatment was applied to three plant cells (shown in the diagrams below).



c) For each plant cell, identify the type of solution has been placed in and the effect it has on the cell.

d) Identify the type of solution that is best suited for both plant and animal cells. Give a reason for your answer.

Cells prefer to be in an isotonic solution where the movement of water in and out is relatively the same. This ensures that the cell is not losing water, nor is it gaining too much water.