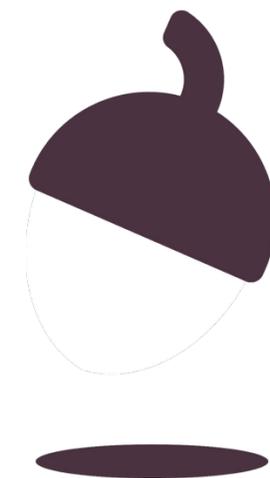


Combined Science - Biology - KS4
Cell Biology

Osmosis

(Downloadable student document)

Miss Wong



OAK
NATIONAL
ACADEMY

Recap of fundamental concepts



Concentration

Concentration is the mass of a solute per unit volume.



Pause the video to complete your task

Quick concept check

- 1. What is a solute?**
- 2. What is a solvent?**
- 3. What does concentration mean?**

Resume once you're finished



Answers

1. A solid that is dissolved to form a solution.
2. The liquid into which a solute is dissolved.
3. The mass of solute per unit volume of the solvent.
4. A solution with a low concentration of solute.



Osmosis



Osmosis is the movement of water from an area of more water to an area of less water, through a partially permeable membrane.



Pause the video to complete your task

Quick concept check

- 1. What is osmosis?**
- 2. Does it require energy?**

Resume once you're finished



Answers to quick concept check

Osmosis is the movement of water from a region of higher concentration of water to a region of lower concentration of water through a partially permeable membrane. It does not require energy.

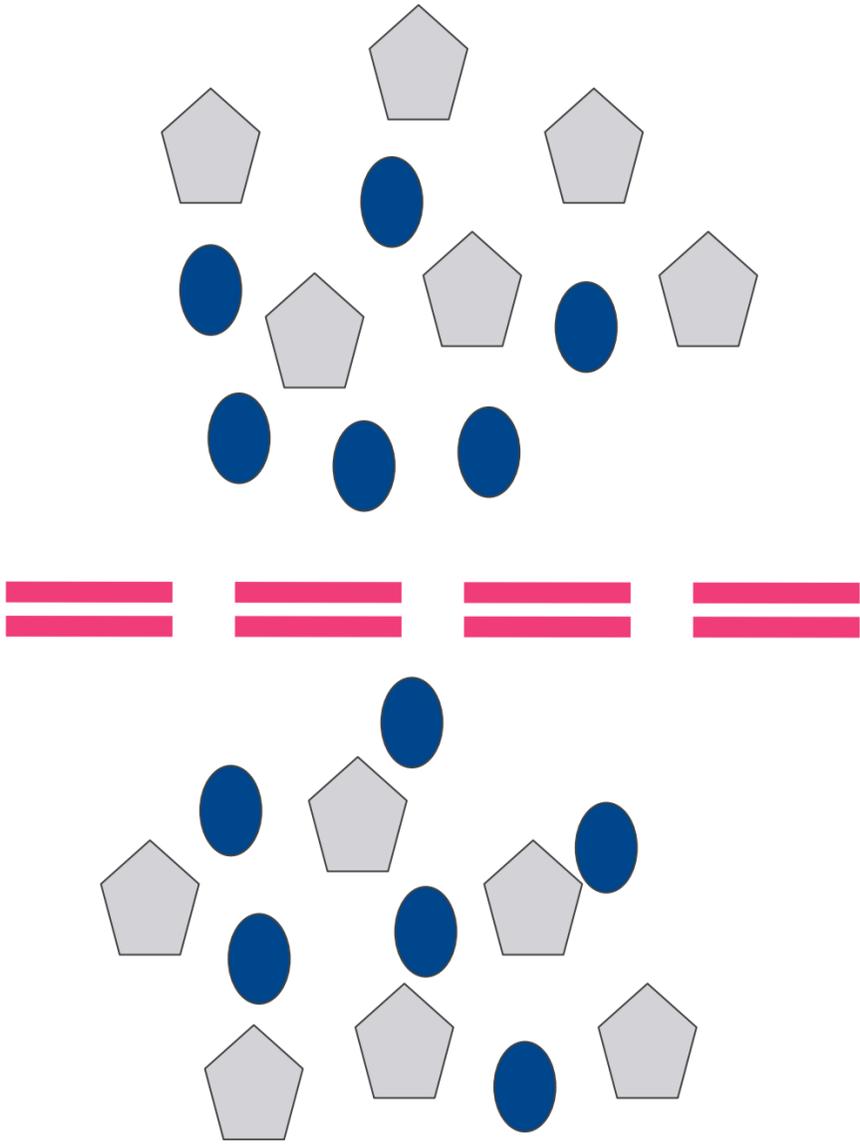


Hypotonic, hypertonic, isotonic

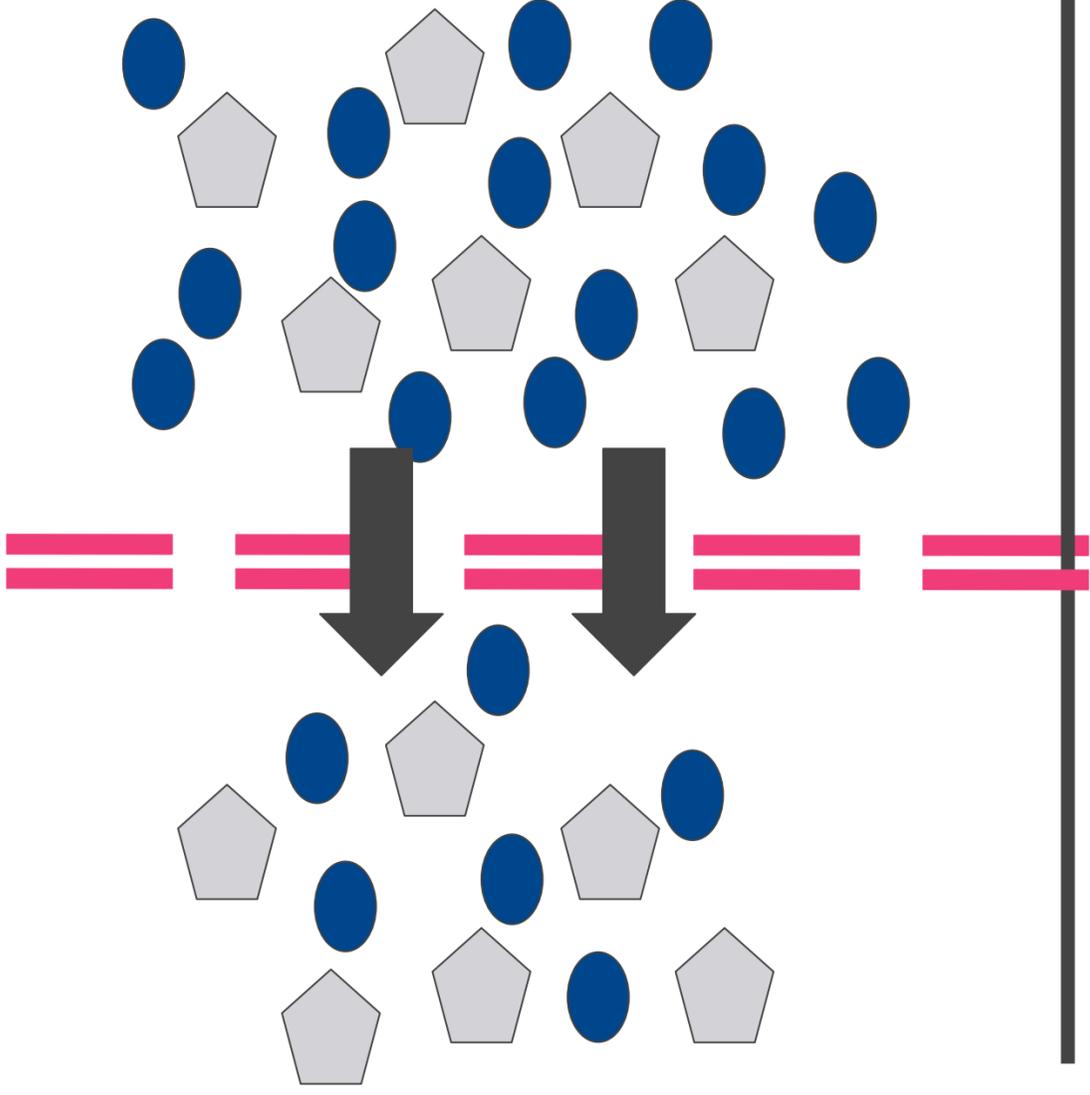


Hypotonic, hypertonic, isotonic solution

Isotonic solution



Hypotonic solution



Inside the cell

Hypertonic solution

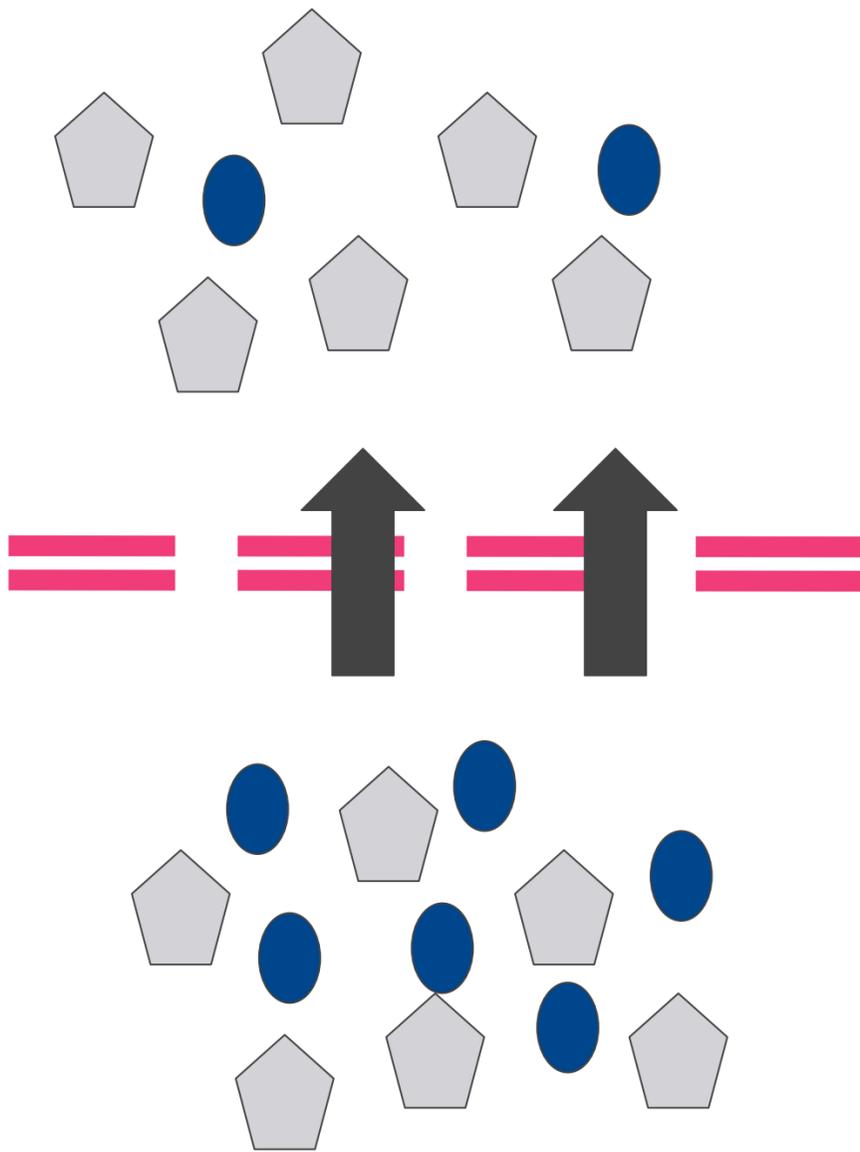


Image created by Miss C. Wong



Pause the video to complete your task

Normal blood glucose concentration is 8 grams per litre. Use numbers to suggest possible concentrations of glucose solutions that are hypertonic, hypotonic and isotonic to blood glucose concentration.

Concentration in g/L

Hypertonic

Hypotonic

Isotonic

Resume once you're finished



Pause the video to complete your task

Answers to quick concept

Concentration in g/L

Hypertonic

Any number above 8

Hypotonic

Any number below 8

Isotonic

8

Resume once you're finished



Osmosis in animal and plant cells



Pause the video to complete your task

Quick concept check

- 1. Under what condition will an animal cell burst?**
- 2. Describe what happens to the cell membrane and cell wall when a plant cell is plasmolysed.**

Resume once you're finished



Answers

1. When an animal cell is placed into a hypotonic solution
2. The cell membrane is detached from the cell wall because the cell has lost water from its vacuole and cytoplasm.



Exam style question



In an experiment, 5% sugar solution is placed inside a visking tubing. The visking tubing is a membrane that contains small pores. Only water can pass through the visking tubing.

The visking tubing with the 5% sugar solution is lowered into a 0.02% sugar solution. The initial level of the 5% sugar solution is indicated by the red fluid.

1. Describe the change in the level of solution inside the visking tubing 20 minutes into the experiment. (1 mark)

1. Explain your answer in the previous question. (3 marks)



Answers

1. The level increases/rises.

2. The solution **outside has more water** than the solution inside the visking tubing.

Water enters the visking tubing **through the partially permeable membrane** into the visking tubing **by osmosis.**



Independent practice



Independent practice

1. What does isotonic mean?
2. If a cell is placed in an isotonic solution, what is happening to the water?
3. What does hypotonic mean?
4. If a cell is placed in an hypotonic solution, what is happening to the water?
5. If this keeps happening what could happen to the cell?
6. What does hypertonic mean?
7. If a cell is placed in an hypertonic solution, what is happening to the water?
8. If this keeps happening what could happen to the cell?
9. A student wants to investigate osmosis. A carrot was placed in a dilute solution.
 - a) What will happen to its mass? Explain your answer.
 - b) The carrot was placed in 0.4 mol/dm^3 solution. Its mass did not change. Explain why this happened.
 - c) What does this tell us about the concentration of the carrot?
 - d) The carrot was placed in a concentrated solution. What will happen to its mass? Explain your answer.



Answers

1. Concentration of solute is the same inside and outside of the cell.
 2. It diffuses in and out of the cell at the same rate.
 3. Concentration of solute is higher inside the cell/solution outside the cell is more dilute.
 4. It moves inside the cell.
 5. It can swell and eventually burst.
 6. Concentration of solute is lower inside the cell.
 7. Water leaves the cell.
 8. It can shrivel.
 9. Mass will increase. This is because there is a higher concentration of salt inside the carrot and so water moves by osmosis into the carrot's cells from a dilute solution to a more concentrated solution
- b) The concentration inside the carrot must be the same (isotonic) so no net movement of water occurs
- c) It is also 0.4 mol/dm^3
- d) The mass will decrease as water moves out from a more dilute solution in the cell to a more concentrated solution outside of the cell.

