

4.2 Movement into & out of Cells

Question Paper

Course	CIE A Level Biology (9700) exams from 2022
Section	4. Cell Membranes & Transport
Topic	4.2 Movement into & out of Cells
Difficulty	Hard

Time allowed: 10

Score: /10

Percentage: /100

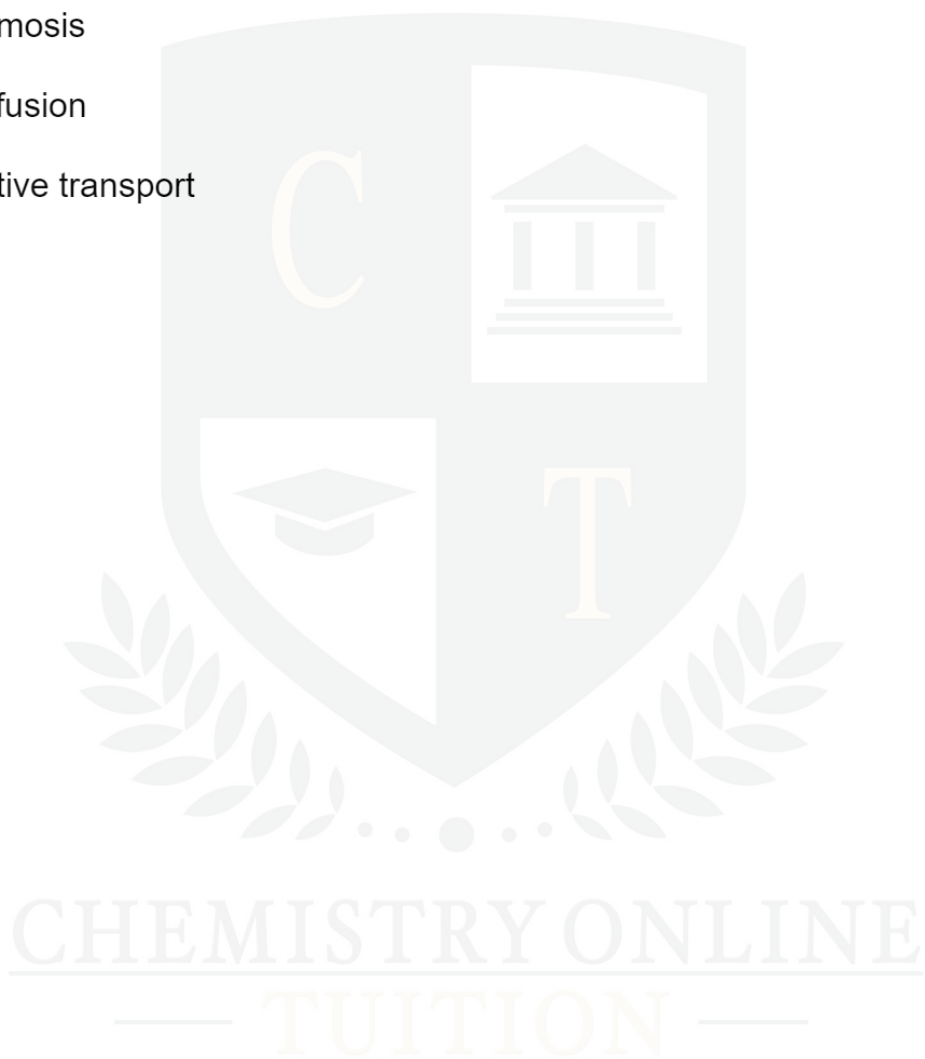
Question 1

The fluidity of the cell surface membrane can be altered by a variety of factors.

Which process would be **least** changed if the fluidity of cell surface membranes is decreased?

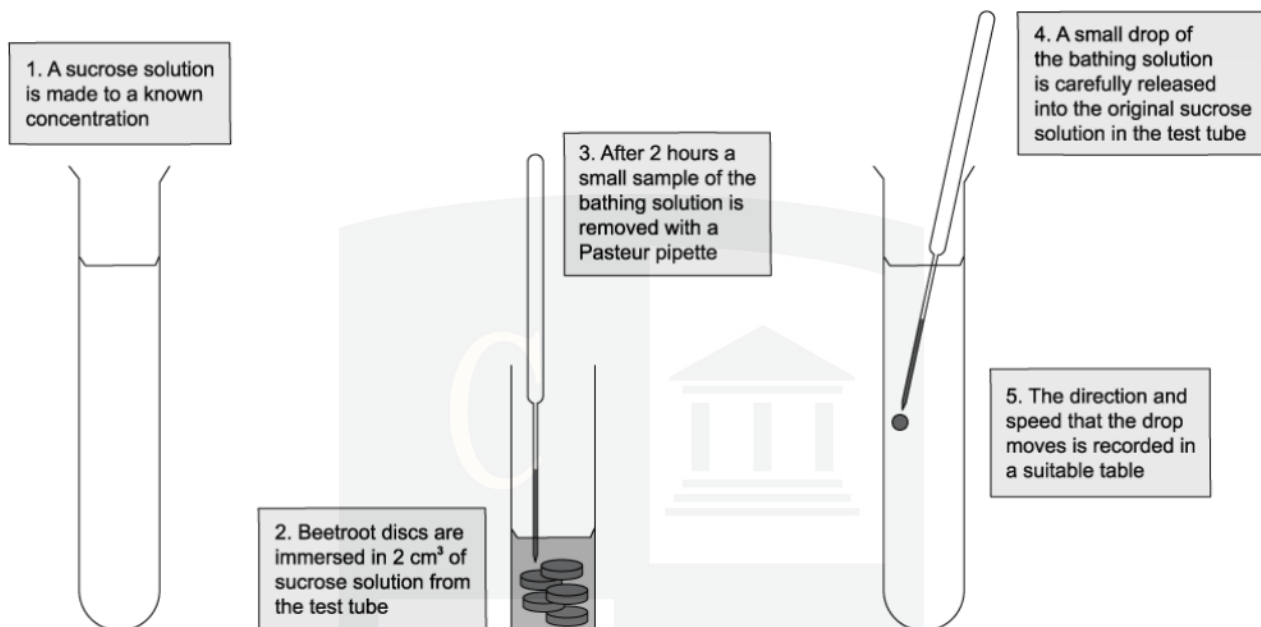
- A endocytosis
- B osmosis
- C diffusion
- D active transport

[1 mark]



Question 2

The diagram shows an experiment constructed by a student to measure the water potential of beetroot cells. The results are shown in the table below.



Concentration of sucrose solution (mol dm ⁻³)	Water potential of sucrose solution (kPa)	Direction and Speed of Droplet Movement
0.1	-251	down, very quickly
0.2		down, quickly
0.3		down, slowly
0.4		laterally
0.5		up, slowly
0.6	-1876	up, quickly
0.7		up, very quickly

What is the water potential of the beetroot cells?

- A** -251
- B** -793
- C** -1083
- D** -1876

[1 mark]

Question 3

An aerobic cell stops responding to growth regulation signals, causing the volume of the cytoplasm to increase and the cell to grow. Eventually the cell dies.

Which of the following cell transport methods affects cell growth?

- 1 diffusion
- 2 active transport
- 3 exocytosis
- 4 osmosis

A 1 only **B** 1 and 4 only **C** 2 and 3 only **D** 1, 2 and 3 only

[1 mark]

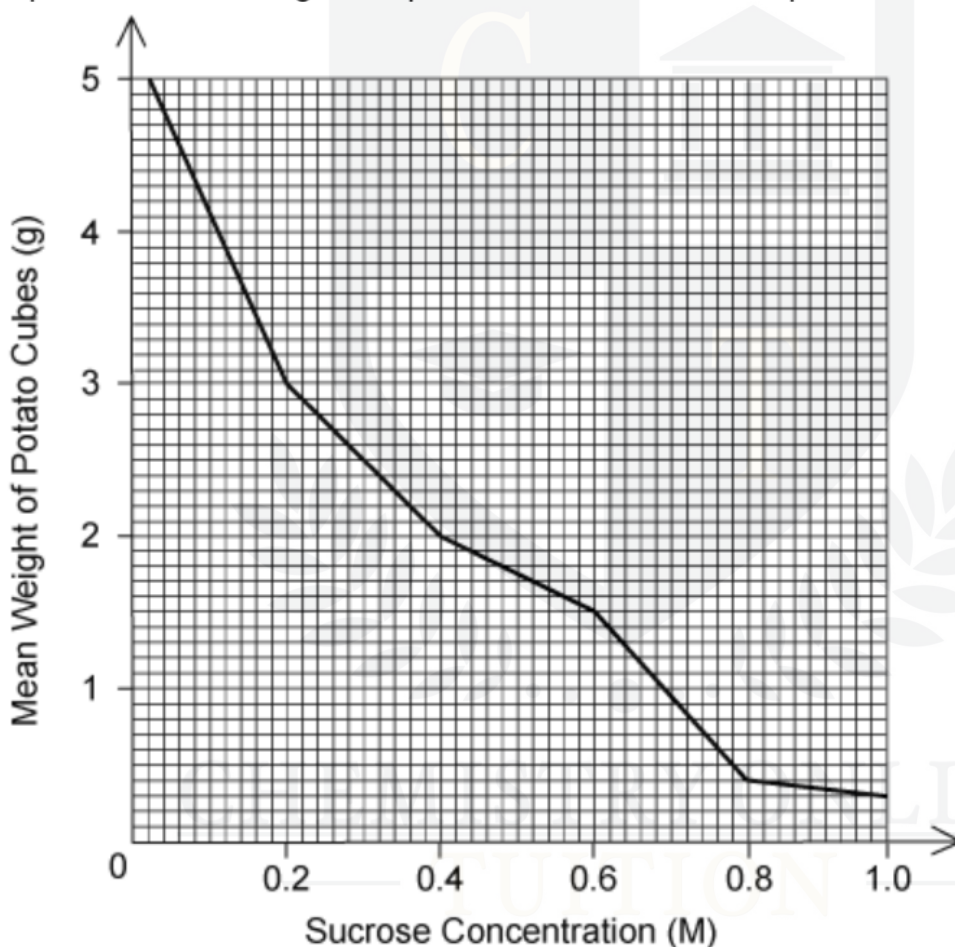
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Question 4

An experiment to calculate the water potential of potato was performed using the following protocol:

1. Dice potato into 1cm^3 cubes.
2. Add potato cubes to 6 test tubes, each containing solution with a different sucrose concentration.
3. Wait 12 hours.
4. Weigh the cubes from each test tube and plot a graph.

The mean weight of the potato cubes was 2.5g before being added to solution and the graph shows the weights of potato cubes after the experiment.



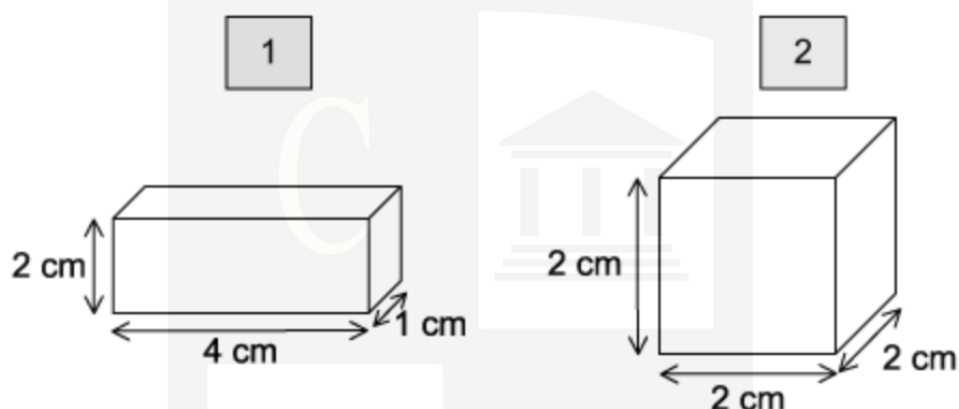
What concentration of sucrose has the same water potential as the potato?

- A 0 M
- B 0.12 M
- C 0.31 M
- D 0.66 M

[1 mark]

Question 5

Two agar blocks of different sizes are produced and universal indicator is added, making the agar turn purple.



The cubes are then placed in hydrochloric acid solution. Universal indicator turns red in acid. After 10 minutes, the amount of agar that has turned red is measured.

In which agar block will the rate of diffusion be fastest and why?

- A 1 because the surface area to volume ratio is smaller
- B 1 because the surface area to volume ratio is bigger
- C 2 because the surface area to volume ratio is bigger
- D both will be the same as the surface area to volume ratio is equal

[1 mark]

Question 6

Radish discs were placed in a solution containing Na^+ ions.

The concentration of O_2 in the air bubbled through the solution was changed and the rate of Na^+ uptake measured. The results are shown.

Concentration of oxygen / %	Rate of Na^+ uptake / arbitrary units
3.10	31
12.6	64
19.8	83

Which process is responsible for the uptake of Na^+ in this experiment?

- A simple diffusion
- B facilitated diffusion
- C osmosis
- D active transport

[1 mark]

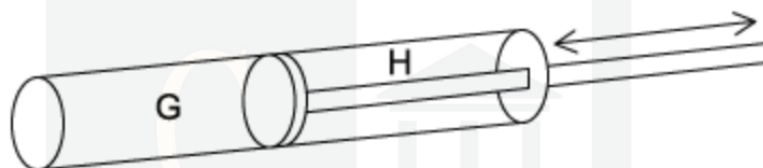
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Question 7

The diagram shows a glass cylinder within which a partially permeable membrane separates two compartments, **G** and **H**, of the same volume (V).

Each compartment contains saline solution, the concentration (C) in **G** is double the concentration in **H**.

The membrane is attached to a sliding piston.



Which equations correctly describe the concentration and volume of compartments when osmotic equilibrium is reached?

- A** $C_G = 2C_H$ and $V_G = 2V_H$
- B** $C_G = C_H$ and $V_G = V_H$
- C** $C_G = 2C_H$ and $V_G = V_H$
- D** $C_G = C_H$ and $V_G = 2V_H$

[1 mark]

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Question 8

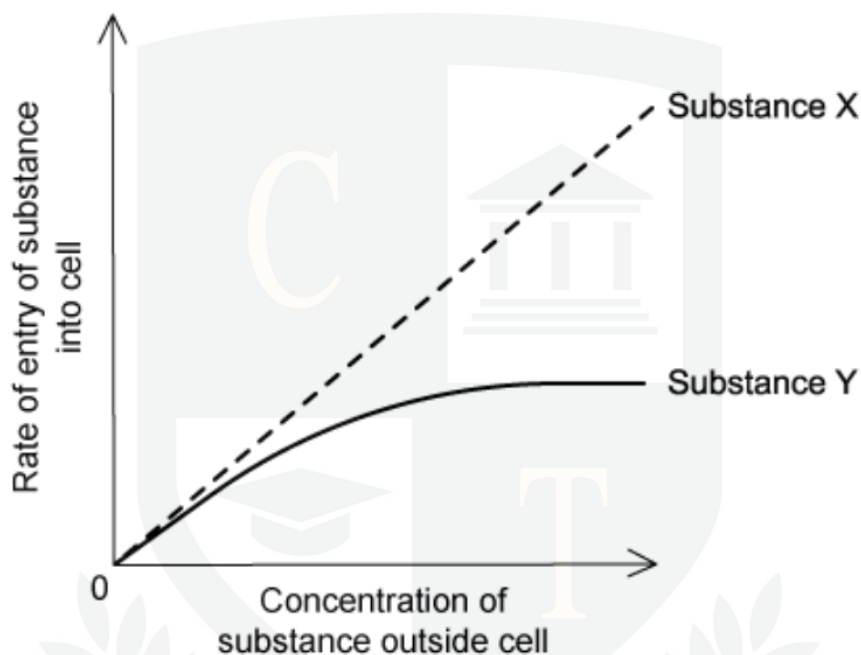
Four solutions are made, each containing 15 g l^{-1} of a molecule. Which molecule would produce the solution with the lowest water potential?

- A** starch
- B** DNA
- C** glucose
- D** insulin

[1 mark]

Question 9

The graph shows how the concentration of a substance affects its rate of absorption into a cell.



Substance **X** enters by simple diffusion, substance **Y** by facilitated diffusion. Why does the curve for substance **Y** plateau above a certain concentration?

- A ATP levels are used up and the cell has to prioritise
- B the concentration of **Y** being the same inside and outside of the cell
- C carrier proteins are saturated
- D above a certain concentration the membrane is impermeable to **Y**

[1 mark]

Question 10

The cell walls of three plant cells, **X**, **Y** and **Z**, are in contact with each other. The water potentials inside each cell are shown in the table.

Cell	Water potential (kPa)
X	-900
Y	-300
Z	-600

How will water move by osmosis between the cells?

- A** Z to X Y to Z X to Y
- B** Y to X Z to Y X to Z
- C** X to Z Y to Z Z to Z
- D** Y to Z Y to X Z to X

[1 mark]

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