

Osmosis: practice questions

7 questions • 23 marks • mark scheme at the back

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Name

Total / 23

- 1** Describe the role of water as a solvent in organisms with reference to digestion, excretion and transport. [3 marks]

- 2** A student ties a bag of dialysis tubing containing concentrated sucrose solution and places it in water. The mass of the bag at the start is 12.5 g. After 40 minutes it is 14.0 g. (a) Calculate the percentage change in mass of the bag. [2] (b) Explain the change in mass. [1] [3 marks]

Answer =

- 3** Cylinders of potato were placed in sugar solutions of different concentrations. The percentage change in mass was measured after 60 minutes. (a) Use the data to estimate the concentration of sugar solution that has no effect on the mass of the potato. [1] (b) Explain why the potato cylinder in 0.0 mol/dm^3 increased in mass. [2] (c) State one variable that must be kept constant in this investigation. [1] [4 marks]

Change in mass of potato	
Concentration / mol/dm^3	Change in mass / %
0.0	+18
0.2	+7
0.4	-4
0.6	-13
0.8	-20

- 4** Explain how water inside cells supports a young, non-woody plant stem. [3 marks]

- 5** **Supplement** [1 mark]

Two solutions are separated by a partially permeable membrane. Solution X is dilute. Solution Y is concentrated. What is the net movement of water?

- A. ☐ From X to Y, because X has a lower water potential
 B. ☐ From X to Y, because X has a higher water potential
 C. ☐ From Y to X, because Y has a higher water potential
 D. ☐ There is no net movement because the membrane is partially permeable

6

Supplement

[5 marks]

A piece of onion epidermis is placed in a concentrated sugar solution. When viewed under a microscope the cell membranes have pulled away from the cell walls. Use the terms plasmolysis, flaccid and water potential to explain what has happened.

7

Supplement

[4 marks]

A red blood cell and a plant cell are each placed in distilled water. The red blood cell bursts but the plant cell does not. Explain these results.

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [3]

- digestion: food molecules dissolve in water so that they can be broken down by enzymes / absorbed (1)
- excretion: waste substances such as urea dissolve in water and are removed in urine (1)
- transport: substances dissolve in the water of plasma / sap and are carried around the organism (1)

2. [3]

- $14.0 - 12.5 = 1.5$ g (1)
- $1.5 \div 12.5 \times 100 = 12\%$ (1) allow 1 mark for correct working if the final answer is wrong
- water moved into the bag by osmosis through the partially permeable tubing (1)

3. [4]

- between 0.30 and 0.35 mol/dm³ (1) allow 0.3 mol/dm³
- water entered the potato cells (1)
- by osmosis through the (partially permeable) cell membrane (1)
- any one from: temperature / volume of solution / time in solution / size (surface area) or mass of cylinder / same type of potato (1) ignore 'amount of potato'

4. [3]

- water enters the cells by osmosis (1)
- the water inside the cells presses outwards on the cell wall (1)
- so the cells become firm / rigid and the stem is held upright (1)

5. [1] Supplement

B B (1)

6. [5] Supplement

- the sugar solution has a lower water potential than the cell contents (1)
- water leaves the cell by osmosis (1)
- through the partially permeable cell membrane (1)
- the cell loses turgor pressure and becomes flaccid (1)
- the cytoplasm shrinks and the cell membrane pulls away from the cell wall: this is plasmolysis (1)

7. [4] Supplement

- distilled water has a higher water potential than the cells / cell contents (1)
- water enters both cells by osmosis (1)
- the red blood cell has no cell wall, so it swells and bursts (1)
- the plant cell wall resists the expansion, so the cell becomes turgid (1) allow 'turgor pressure stops more water entering'