Higher Combined version — Higher Tier (★) included; Separate-only (◆) removed.

Q1. Define osmosis precisely, using the terms water potential and partially permeable membrane.

[2 marks]

Q2. A student places potato cylinders in different concentrations of sucrose solution. In a 1.0 mol/dm³ solution, the potato lost 18% of its mass. In distilled water, it gained 9% mass. Explain both results.

[4 marks]

Q3. Explain the difference between a turgid and plasmolysed plant cell and why turgidity is important.

[3 marks]

★ HIGHER TIER

Q4. ★ State the water potential of pure water and explain why solutions have a lower water potential.

[1 mark]

Total: 10 marks

Q1 (2 marks)

Define osmosis precisely, using the terms water potential and partially permeable membrane…

• Net movement of water molecules [1]

• From high water potential (dilute solution) to low water potential (concentrated solution) through a partially permeable membrane [1]

Q2 (4 marks)

A student places potato cylinders in different concentrations of sucrose solution. In a 1….

• In 1.0 mol/dm³: solution has lower water potential than potato cell contents [1]

• Water moves out of potato cells by osmosis → cells become flaccid → mass decreases [1]

• In distilled water: water has higher water potential than inside cells [1]

• Water moves into cells by osmosis → cells become turgid → mass increases [1]

Q3 (3 marks)

Explain the difference between a turgid and plasmolysed plant cell and why turgidity is im…

• Turgid: water absorbed by osmosis → vacuole swells → presses against cell wall → firm cell [1]

• Plasmolysed: water lost by osmosis → membrane pulls away from cell wall → limp cell [1]

• Turgidity provides structural support in plants without a skeleton — prevents wilting [1]

Q4 (1 mark) [★ HT]

★ State the water potential of pure water and explain why solutions have a lower water pot…

• Pure water: water potential = 0 (kPa) [1] — solutes lower water potential because solute particles reduce the proportion of free water molecules