

Exercise walk-through

Facilitated Diffusion ■ 2.6

eXercise

You must be able to

- describe **facilitated diffusion** 易化扩散 (passive, protein-assisted)
- distinguish **channel** 通道 and **carrier** 载体 proteins
- explain why it is still passive

Method — Facilitated diffusion

Facilitated diffusion moves molecules **down** their concentration gradient **through a protein**. It is **passive** — no ATP — but needs a protein because the molecule cannot cross the bilayer alone.

Method — Channel vs carrier

- **Channel proteins** form a pore that lets specific ions or water pass.
- **Carrier proteins** bind the molecule and change shape to move it across.

Method — Still passive

Even though a protein is used, no energy is spent because the substance moves **down** its gradient — the protein just provides a route.

Method — A worked example

Glucose enters a cell through a **carrier protein** (facilitated diffusion) when glucose is more concentrated outside — down the gradient, no ATP.

Practice 2.1 ■ 1 mark

Is facilitated diffusion active or passive?

Solution 2.1

Method: Facilitated diffusion

Worked steps

Passive **B1**.

Practice 2.2 ■ 2 marks

Name the two types of transport protein used.

Solution 2.2

Method: Still passive

Worked steps

Channel proteins and carrier proteins **B1** **B1**.

Practice 2.3 ■ 1 mark

Why does glucose need a protein to enter by facilitated diffusion?

Solution 2.3

Method: A worked example

Worked steps

Glucose is large and polar, so it cannot cross the hydrophobic bilayer without a protein **B1**.

Exam-style 3.1 ■ 1 mark

Facilitated diffusion requires

- A** ATP and a protein
- B** a protein but no ATP
- C** neither a protein nor ATP
- D** ATP but no protein

Solution 3.1

- A** ATP and a protein
- B** a protein but no ATP
- C** neither a protein nor ATP
- D** ATP but no protein



Worked steps

B — a protein but no ATP.

Exam-style 3.2 ■ 2 marks

A carrier protein moves glucose into a cell where glucose is less concentrated.

- (a) State whether ATP is used, with a reason.
- (b) Explain how a carrier protein differs from a channel protein.

Solution 3.2

Method: A worked example

Worked steps

- (a) No ATP — glucose moves down its gradient, which is spontaneous **M1 A1**.
- (b) A channel forms a pore for the molecule to pass through; a carrier binds the molecule and changes shape to move it **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain why facilitated diffusion is passive even though it uses a protein.

Solution 3.3

Worked steps

The molecule still moves **down** its concentration gradient, so no energy is spent; the protein only provides a passageway across the membrane **M1 A1**.