AP BIOLOGY • EXERCISE SHEET

2.6 Facilitated Diffusion

Name: _____ Class: _____ Date: _____ **Total: 11 marks**

Objective

Build the skills to answer exam questions on **facilitated diffusion**.

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

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

■ 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.

■ 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.

■ 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.

■ A worked example

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

2 Practice

Now apply the methods above.

2.1 Is facilitated diffusion active or passive? [1]

2.2 Name the two types of transport protein used. [2]

2.3 Why does glucose need a protein to enter by facilitated diffusion? [1]

3 Exam-style questions

3.1 Facilitated diffusion requires [1]

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

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

(a) State whether ATP is used, with a reason. [2]

(b) Explain how a carrier protein differs from a channel protein. [2]

3.3 Explain why facilitated diffusion is passive even though it uses a protein. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **2.6 Facilitated Diffusion** lesson on the **Learn** page;

- read the **Facilitated Diffusion** section of the AP Biology handout on the **Know** page.

Solutions

2.1 Passive.

2.2 Channel proteins and carrier proteins.

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

3.1 B —a protein but no ATP.

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

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