

3.3 Active transport

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

KEY WORDS active transport 主动运输 • root hairs 根毛 • carrier proteins 载体蛋白
• transport 运输 • energy 能量

Objective

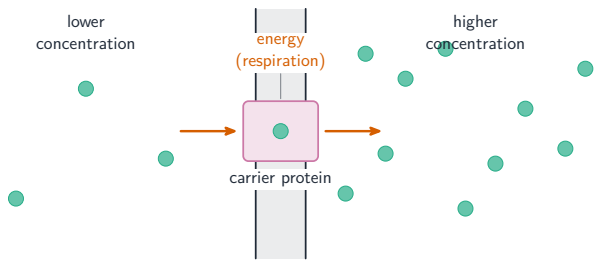
Build the skills to answer exam questions on **active transport** 主动运输 — the definition, why it needs energy, and the role of **carrier proteins** 载体蛋白.

You must be able to:

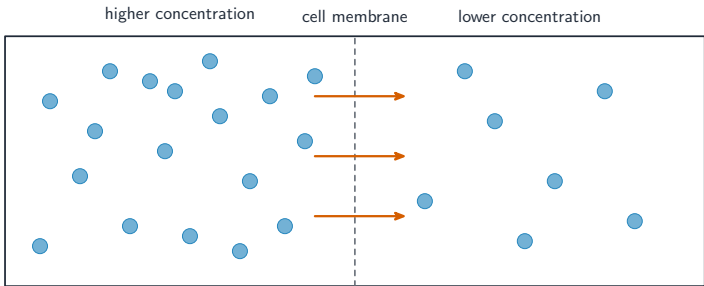
- define active transport (movement against the gradient, using energy)
- explain why it needs energy from respiration
- give an example (root hairs taking up mineral ions)

1 Worked examples

■ Active transport



Active transport: against the gradient, using energy from respiration and a carrier protein



net movement of particles down the concentration gradient

Active transport contrasts with passive diffusion

Process	Direction	Energy?
diffusion	high → low	no
osmosis	high → low water potential	no
active transport	low → high (against)	yes

2 Practice

2.1 Define active transport.

[2]

2.2 State the source of energy for active transport.

[1]

3 Exam-style questions

3.1 Which process moves particles **against** the concentration gradient?

[1]

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

3.2 Root hair cells take up mineral ions from the soil.

(a) Name the process used when the ions are more concentrated inside the cell. [1]

(b) Explain why this process needs energy. [2]

3.3 Explain the role of carrier proteins in active transport. [2]

Solutions

2.1 the movement of particles through a membrane from a lower to a higher concentration (against the gradient), using energy from respiration.

2.2 respiration.

3.1 C. Active transport moves particles against the gradient.

3.2 (a) active transport.

(b) the ions move against the concentration gradient (uphill), which requires energy.

3.3 carrier proteins in the membrane pick up the ions/molecules and carry them across the membrane using energy.