

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

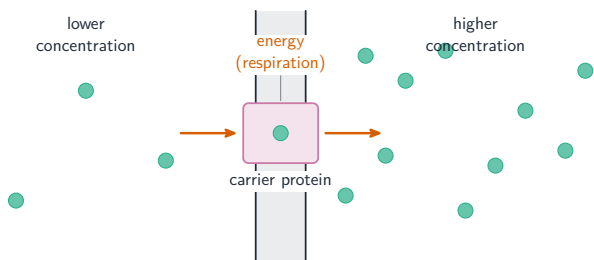
Build the skills to answer exam questions on **active transport** 主动运输 — the definition, why it needs energy, and the role of **carrier proteins** 载体蛋白.

You must be able to:

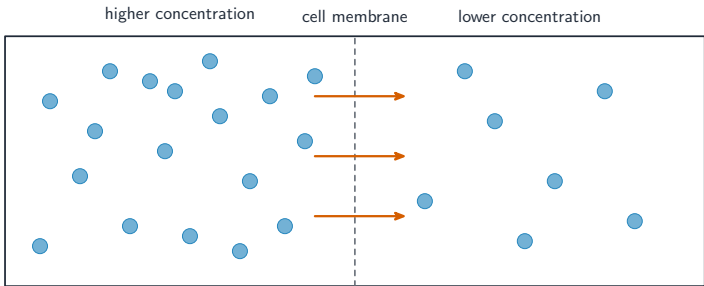
- define active transport (movement against the gradient, using energy)
- explain why it needs energy from respiration
- give an example (root hairs taking up mineral ions)

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

B

C

D
- 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]
