

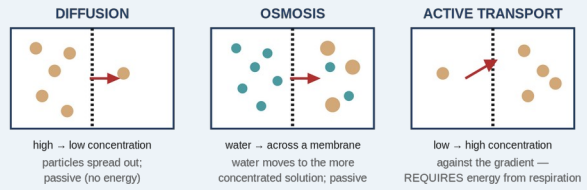
2.4 Movement of Substances In & Out of Cells

Mr Curran · practical-science.com

1. KEY VOCABULARY

TERM	MEANING
Diffusion	Net movement of particles from high to low concentration.
Osmosis	Diffusion of water across a partially permeable membrane.
Active transport	Movement from low to high concentration, using energy.
Concentration gradient	The difference in concentration between two areas.
Partially permeable	A membrane that lets some particles through, not others.

2. THE THREE PROCESSES



3. COMPARING THEM

	DIRECTION	ENERGY?
Diffusion	High → low	No (passive)
Osmosis	High → low water conc.	No (passive)
Active transport	Low → high	Yes — from respiration

4. WHAT SPEEDS UP DIFFUSION

- a steeper concentration gradient
- a higher temperature (particles move faster)
- a larger surface area
- a shorter distance to travel (thinner membrane)

5. OSMOSIS IN CELLS

Animal cell in pure water: swells and may burst (no cell wall to stop it).

Plant cell in pure water: becomes turgid and firm — the cell wall stops it bursting. In concentrated solution it becomes flaccid.

6. THE WHY

Why active transport needs energy: it moves substances AGAINST the gradient — the opposite of their natural flow — so energy from respiration is required.

Why root hair cells use active transport: soil has a lower mineral concentration than the cell, so minerals must be pulled in against the gradient.

7. COMMON EXAM MISTAKES

- ✗ "Osmosis is the movement of any substance."
- ✓ Osmosis is the movement of WATER only.
- ✗ "Diffusion needs energy."
- ✓ Diffusion and osmosis are passive — only active transport needs energy.
- ✗ "Active transport goes high to low."
- ✓ Active transport goes LOW to HIGH (against the gradient).

8. SELF-CHECK · cover & quiz

Can you...

1. Define diffusion, osmosis and active transport?
2. State the direction and energy use of each?
3. List four factors that speed up diffusion?
4. Explain what happens to animal and plant cells in pure water?
5. Explain why active transport requires energy?