*This is the **Higher Combined** version — includes Higher Tier content. Some Separate-only details are omitted.*

Substances move across membranes by diffusion, osmosis or active transport depending on the concentration gradient and energy requirements.

Required Practical: Investigating osmosis in plant tissue.

- Diffusion: passive, high → low concentration, any substance, no energy
- Osmosis: passive, water only, through partially permeable membrane, high → low water potential
- Active transport: against concentration gradient, requires ATP and carrier proteins
- Turgid/plasmolysed/crenated cells from osmosis in different solutions

★ **HT** SA:V ratio explains why small organisms can rely on diffusion; larger need specialised exchange surfaces

Key Terms

Osmosis	Water movement through partially permeable membrane from high to low water potential
Active transport	Movement against concentration gradient — needs ATP
Partially permeable membrane	Membrane allowing small molecules (water) through but not large ones

■ **Exam Tip:** For any question about movement of substances: first check direction relative to concentration gradient. If against → active transport. If with → diffusion/osmosis (depending on substance).