

Exchange surfaces



1. Diffusion is the movement of particles from a high concentration to a low concentration

2.

Feature	How it helps efficient diffusion
Thin membranes	short diffusion path
Good blood supply	maintains concentration gradient by removing substances that have diffused
Large surface area	lots of opportunity for diffusion to take place

3. Osmosis

4. The movement of particles from a low concentration to a high concentration - it requires energy from respiration

Continued

5. Respiration in the mitochondria
6. Absorbing minerals from the soil, absorbing glucose into the blood from the intestines
7. Concentration gradient, temperature, surface area available
8. oxygen, water, carbon dioxide
9. By diffusion across the gills

Application

1.

- $SA = 6 \times 9\text{cm}^2$ so 54cm^2
- $\text{Volume} = 3 \times 3 \times 3 = 27\text{cm}^3$
- $SA: \text{vol} = 54:27 \quad 2:1$

2. Increasing the temperature speeds up diffusion because the particles have more kinetic energy at higher temperatures and so will spread out more quickly.

3. Root hair cells take up mineral ions by active transport. This means using energy from respiration to transport ions from the soil, where they are in low concentration, into the cell, where the concentration is higher.

4. Larger, multicellular organisms need internal exchange surfaces like the villi and alveoli to give them a large enough surface area to be able to absorb all the substances they need

5a) When placed in water, potato cylinders expand because there is a higher concentration of water outside the cell than there is inside, so water moves in by osmosis and the cell swells.

5b) 0.3 mol/dm^3 . This is the solution where the potatoes don't lose or gain any mass, so there must be the same amount of water on both sides.

6. Cell A, because there is the largest concentration gradient and there is more outside than in.

Extension

The person with coeliac disease has a reduced surface area because the intestines are not as folded. This means they would not be able to absorb food by diffusion as easily and would have to use their fat stores for energy, making them lose weight.