

Exchange and transport in animals

Transport and exchange

Substances transported

Oxygen Carbon dioxide Water Food molecules
Mineral ions Urea

Surface area : volume ratio

Surface area ÷ volume Bigger organism, smaller ratio

Single cell

Large ratio Diffusion enough

Multicellular

Small ratio Exchange surface Transport system

Alveoli

Large surface area One cell thick Moist lining
Blood supply Ventilation

Diffusion rate Triple only

Surface area Triple only

Larger, faster

Concentration gradient Triple only

Steeper, faster

Diffusion distance Triple only

Shorter, faster

Fick's law Triple only

SA × conc. difference ÷ thickness

Blood and vessels

Red blood cells

Haemoglobin Biconcave No nucleus

White blood cells

Phagocytes engulf Lymphocytes: antibodies

Plasma

Carries dissolved substances

Platelets

Clotting

Arteries

Thick wall Elastic fibres High pressure

Veins

Valves Wide lumen

Capillaries

One cell thick Exchange

Heart and circulation

Double circulation

Lungs circuit Body circuit

Major vessels

Vena cava Pulmonary artery Pulmonary vein Aorta

Valves

Prevent backflow

Wall thickness

Ventricles thicker Left thicker than right

Cardiac output

Stroke volume × heart rate

Respiration

Exothermic

Releases energy Metabolic processes

Aerobic

Needs oxygen CO₂ + water More energy

Anaerobic in animals

Lactic acid Less energy

Anaerobic in plants and yeast

Ethanol + CO₂

Core practical

Respirometer Soda lime Liquid moves towards organisms