Gas Diffusion:

- Each gas diffuses from areas of **high** pressure to an area of **low** pressure

- **Partial** pressure is the pressure that a single gas exerts

    - The partial pressure of O_2 in the atmosphere is 21.2 kPa in the atmosphere and 13.3 kPa in the alveoli and 5.3 kPa in the capillaries

http://www.nelson.com/ABbio20-30/teacher/protect/otr/Bio2030OTR/attachments/i_AnimationSimulation/gas_gradients.html

Transport of Oxygen in the Blood:

- Two methods of transport:

    1. As a dissolved gas in plasma
    2. carried by hemoglobin

1. Transport as a dissolved gas

- Oxygen dissolves directly into the plasma of oxygen poor blood of capillaries

- Oxygen in the alveoli exerts higher pressure than oxygen in capillaries

- Accounts for only **3%** of oxygen transport

2. Transport by hemoglobin (Hb)

- Oxygen easily combines with iron in a hemoglobin (Hb) molecule to form **oxyhemoglobin** (HbO_2)

- Occurs in RBC and accounts for **97%** of O_2 transport

- Oxygen is released at tissue where it is needed and hemoglobin returns to the lungs

- Three factors that affect oxygen release by hemoglobin:

    a. Temperature - increased temp. increases release of O_2

    b. Blood **pH** - release of O_2 faster as blood pH ~~increases~~ decreases

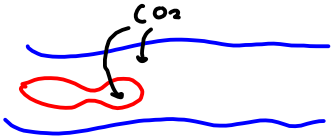
    c. Oxygen **concentration** of tissues - decreased $[O_2]$ will speed up O_2 release

Transport of Carbon Dioxide:

- CO_2 enters our blood from body tissues where it is produced
- CO_2 is transported in our blood in 3 ways:

1. Transport in Blood Plasma:

- **7%** of CO_2 dissolved in plasma $CO_{2(aq)}$
- it is released when it reaches the lungs because of the concentration gradient



2. Transport in the Cytoplasm of RBC's

- **70%** of CO_2 moves into RBC cytoplasm
- $CO_{2(g)}$ joins H_2O to form H_2CO_3 (carbonic acid)

$$CO_{2(g)} + H_2O_{(l)} \rightarrow H_2CO_{3(aq)}$$

- enzyme carbonic anhydrase helps this reaction occur
- H_2CO_3 is unstable and breaks down into bicarbonate ions (HCO_3^-) and hydrogen ions (H^+)

$$H_2CO_{3(aq)} \rightarrow HCO_3^-{}_{(aq)} + H^+_{(aq)}$$

- H^+ ions combine with hemoglobin to form **reduced haemoglobin**
- This helps $O_{2(g)}$ leave the RBC
- When the RBC's reach our lungs the above processes reverse themselves and CO_2 is moved into our alveoli and breathed out

3. Transport by hemoglobin

- Remaining CO_2 (about 23%) binds directly to hemoglobin (protein part) and is transported to the lungs
- CO_2 + hemoglobin = **carbinohemoglobin**