10.1 Mixtures of Gases

Definitions
- Partial pressure
- Dalton's Law of Partial Pressures

Mixtures of Gases
- Dalton hypothesized that gas particles behaved independently and that the pressure exerted by a particular gas is the same whether it exists by itself or in a gas mixture (at a constant temperature).
- For 100 kPa of air, 79.1 kPa of nitrogen and 20.9 kPa of oxygen.
- $p_{total} = p_1 + p_2 + p_3 + \ldots$
- Dalton's Law of Partial Pressures: The total pressure of a mixture of non-reacting gases is equal to the sum of the partial pressures of the individual gases.

Explaining Dalton's Law of Partial Pressures
- The two concepts of KMT that explain partial pressures
    - The pressure of a gas is caused by the collisions of molecules with the walls of the container.
    - Gas molecules act independently of each other.

Applications of Partial Pressure
- When collecting gas using the downward displacement of water you need to take into consideration the partial pressure of water (for a specific temperature).
- Eg. Collect 100 kPa of a gas using the downward displacement of water at 20°C. After adjusting the water levels to equalize pressure inside and outside the collection vessel calculate the partial pressures of the gas and the water vapour in the collection vessel. (Use table 3 on page 464.)

$p_{total} = p_{gas} + p_{water}$
100 kPa = p_{gas} + 2.34 kPa
p_{gas} = 100 kPa – 2.34 kPa
p_{gas} = 97.66 kPa

Homework
- Practice 1-3, 5-10
- Section 1-5