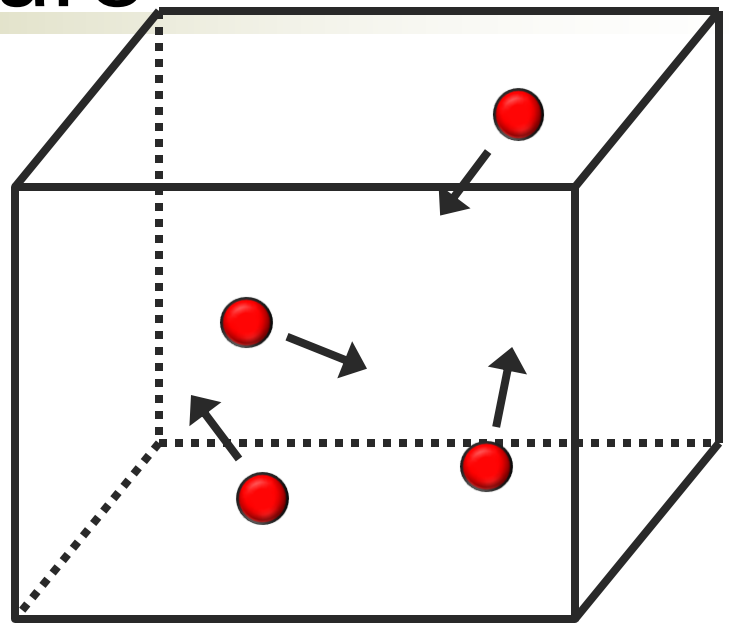
Gas Laws

Microscopic Picture

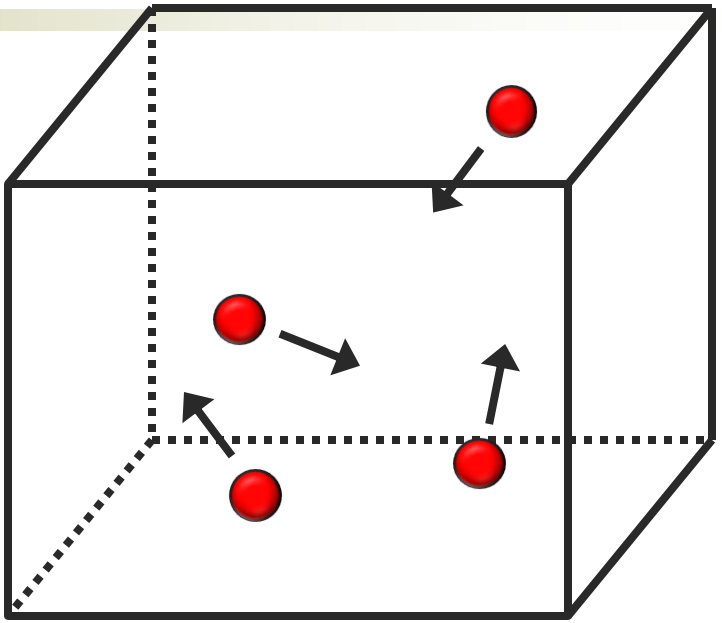


- Three main parameters

- Parameters related through an equation of state

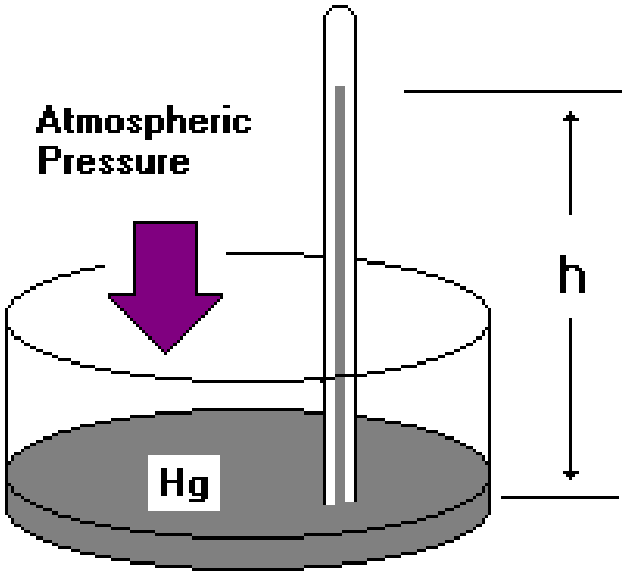
Ideal Gas Law

- Ideal Gas Law
- R - ideal gas law constant
- Extensive variables
- Intensive variable
- Molar Volume
- Ideal Gas Law



Pressure

- P = force/area
- Measured using a manometer
- At mechanical equilibrium
- Units



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- What is the maximum height that a water column can be raised by applying a vacuum to the top of the tube?
  - A – 0.0103 m
  - B – 0.103 m
  - C – 1.03 m
  - D – 10.3 m
  - E – 103 m

Temperature

- Absolute temperature scale
- Kelvin scale
- Celsius scale
- Conversion between the two

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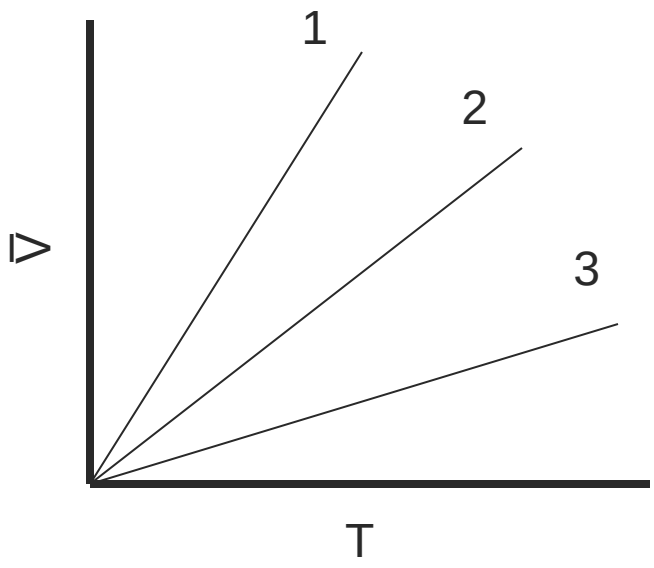
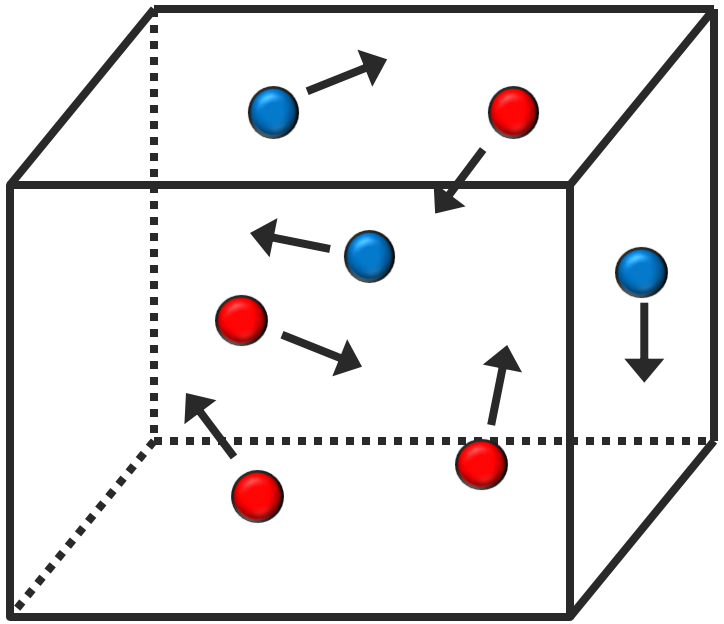
- A plot of molar volume as a function of temperature for an ideal gas a constant pressure is a straight line.
- Which curve represents a gas at the highest pressure?
  - A – 1
  - B – 2
  - C - 3
  - D – all pressures are the same
- Ideal gas law assumptions



Partial Pressure

- Dalton's law of partial pressures



- Mole fraction

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- 2.69 g of PCl_5 (MW = 208.3 g/mol) is placed in a 1.0 L flask and vaporizes at 250 ^oC. The pressure in the flask at 250 ^oC at equilibrium is 1.0 ar. PCl_5 can dissociate according to the following equation:

$$PCl_5\ (g) \leftrightarrow PCl_3\ (g) + Cl_2\ (g)$$

What is the particle pressure of each component?