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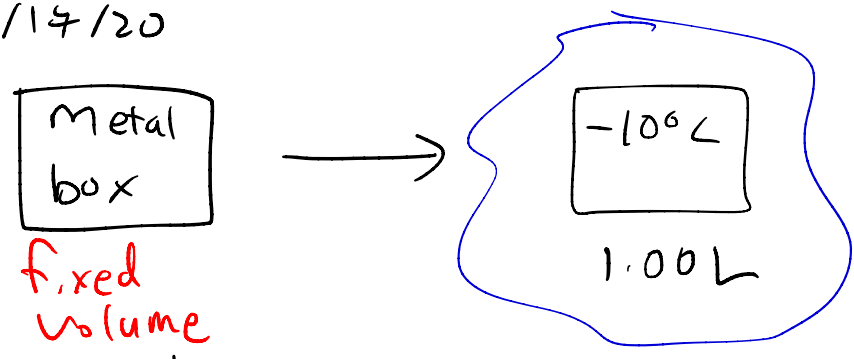


fixed volume

1.00 L, 1 atm

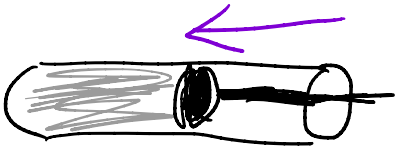
25°C

P ?

When temperature decreases, the average energy of the molecules decreases, so the molecules collide with inside of the container with less energy. Since the volume will not change, the pressure must change.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \Rightarrow \frac{P_1}{T_1} = \frac{P_2}{T_2}$$

P @ T proportional



piston

If the volume of a gas is decreased (while maintaining temperature), the surface area inside the container will also decrease. Since $P = F/A$ (pressure is force divided by area), this means the pressure will increase.

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \Rightarrow P_1V_1 = P_2V_2 \qquad P \propto \frac{1}{V}$$

"pressure is inversely proportional to volume"

Manipulations of the ideal gas law

$$PV = nRT \qquad n = \frac{m}{MM} \leftarrow \text{mass} \leftarrow \text{molar mass}$$

$$PV = \frac{m}{MM}RT$$

Density

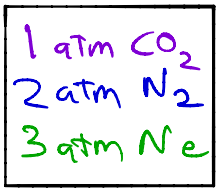
$$\rho = \frac{\text{mass}}{\text{volume}} \qquad \frac{m}{V} = \frac{P \times MM}{RT}$$

(ρ = rho)

Molar mass

$$MM = \frac{mRT}{PV}$$

Partial Pressure



If all gases in a container are ideal, since the gases do not interact with each other (except to collide), the total pressure in the container is equal to the sum of the individual pressures.

$P_T = P_{CO_2} + P_{N_2} + P_{Ne}$ → partial pressures

If the gases are not ideal, the total pressure is not necessarily the sum of the partial pressures.

Quiz #1

- Ideal Gases – 3 assumptions
- Ideal Gas Law
  - "original" – density
  - change in conditions – molar mass
- Pressure – what is it – units
- STP (0°C, 1 atm)
- "The Graph" – Molecular energy distribution – vapor pressure

not on quiz:
- RMS
- effusion or diffusion
- real gas laws