

$$\lambda = \bar{c}_{rel} \Delta t$$

O volume do cilindro $\sigma \lambda$

A densidade numérica $N = \frac{N}{V} = \frac{1}{\sigma \lambda} = \frac{1}{\sigma \bar{c}_{rel} \Delta t}$

$$N = \frac{p}{RT}$$

$$\frac{p}{RT} = \frac{1}{\sigma \bar{c}_{rel} \Delta t}$$

$$\Delta t = \frac{RT}{\sigma \bar{c}_{rel} p}$$

$$Z = \frac{1}{\Delta t} = \frac{\sigma \bar{c}_{rel} p}{RT}$$

$$Z = \frac{\sigma \bar{c}_{rel} p}{RT} = \frac{\sigma p \sqrt{2} \bar{c}}{RT} =$$

$$= \frac{0,43 (10^{-9})^2 \text{ m}^2 \cdot 101325 \text{ Pa} \sqrt{2} \cdot 474,52 \text{ m/s}}{1,381 \cdot 10^{-23} \text{ J/K} \cdot 298,15 \text{ K}}$$

$$= 71000,3 \text{ S} \cdot \cancel{\text{m}^2} \cdot \cancel{\frac{\text{J}}{\text{m}^2}} \cdot \cancel{\frac{\text{m}}{\text{s}}} \cdot \frac{1}{\cancel{\text{N} \cdot \text{m}}} \cdot 10^5 =$$

$$= 7,1 \cdot 10^9 \frac{1}{\text{s}}$$

$$\lambda = \bar{c}_{\text{rel}} \Delta t = \cancel{\bar{c}_{\text{rel}}} \frac{kT}{\sigma \cancel{\bar{c}_{\text{rel}}} \rho} = \frac{kT}{\sigma \rho}$$

$$\lambda = \frac{kT}{\sigma \rho}$$

$$\lambda = \frac{kT}{\sigma \rho} = \frac{1,381 \cdot 10^{-23} \frac{\text{J}}{\text{K}} \cdot 298,15 \text{ K}}{0,43 (10^{-9})^2 \text{ m}^2 \cdot 101325 \frac{\text{N}}{\text{m}^2}} =$$

$$= 0,00945 \cancel{\text{N} \cdot \text{m}} \frac{1}{\cancel{\text{N}}} \cdot 10^{-9} = 9,45 \cdot 10^{-8} \text{ m}$$

$$\lambda = 94,5 \text{ nm}$$