

In una giornata d'inverno lasciamo all'aperto una bottiglia da 1,50 L, chiusa, che contiene aria alla pressione di 103 kPa. La bottiglia contiene  $4,22 \times 10^{22}$  molecole di azoto e ossigeno (massa molare media 28 g) e il sistema formato da queste molecole può essere considerato un gas perfetto.

- ▶ Calcola l'energia cinetica media delle molecole dovuta al loro spostamento nella bottiglia.
- Calcola la temperatura dell'aria contenuta nella bottiglia.  $[5,49 \times 10^{-21} \text{ J}; 265 \text{ K}]$

$$PV = MRT \implies T = \frac{PV}{MR} = \frac{PV}{NA} = \frac{PV}{NKB} = \frac{PV}{(4,22 \times 10^{32})} (1,50 \times 10^{3} \text{ m}^{3})$$

$$= 26,52... \times 10^{1} \text{ K} \approx 265 \text{ K}$$

$$K_{Ma} = \frac{3}{2} K_{B}T = \frac{3}{2} (1,38 \times 10^{-23} \frac{J}{K}) (265,2... \text{ K}) = 549,17... \times 10^{-23} \frac{J}{K}$$

$$P = \frac{N}{3V} = \frac{N}{3V} = \frac{3}{2} (1,38 \times 10^{-23} \frac{J}{K}) (265,2... \text{ K}) = 549,17... \times 10^{-23} \frac{J}{K}$$

$$= \frac{1}{3} (1,38 \times 10^{-23} \frac{J}{K}) (265,2... \text{ K}) = \frac{549,17... \times 10^{-23} \frac{J}{K}}{NM}$$

$$= \frac{1}{3} (1,50 \times 10^{3} \frac{J}{K}) (1,50 \times 10^{3} \frac{J}{K}) (1,50 \times 10^{3} \frac{J}{K})$$

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$$= \frac{1}{2} (1,38 \times 1$$

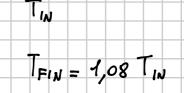
3/5/2022



La camera d'aria di una bici ha un volume di  $2.5 \times 10^{-3}$  m<sup>3</sup> e contiene 0,715 mol d'aria alla temperatura di 299 K. La bici viene lasciata al Sole per alcune ore e la temperatura dell'aria all'interno aumenta dell'8%.

- Calcola l'energia cinetica media traslazionale delle molecole prima e dopo l'esposizione al Sole.
- Calcola la pressione dell'aria nella camera d'aria prima e dopo l'esposizione al Sole.

$$[6{,}19\times10^{-21}\,\textrm{J;}\,6{,}\,69\times10^{-21}\,\textrm{J;}\,7{,}1\times10^{5}\,\textrm{Pa;}\,7{,}7\times10^{5}\,\textrm{Pa}]$$



PRIMA

$$K_{AM} = \frac{3}{2} k_B T = \frac{3}{2} (1,38 \times 10^{-23} \frac{5}{K}) (299 K) = 618,33 \times 10^{-23} \frac{5}{K}$$

DOPO

 $K_{AM} = (6,1883 \times 10^{-21} \frac{5}{K}) \cdot (1,08) = 6,6844 \dots \times 10^{-21} \frac{5}{K}$ 

PRIMA

 $P = \frac{M}{V} = (0,715 \text{ mol.}) \cdot (8,31 \frac{5}{K \cdot mol.}) \cdot (293 K) = 6.58 \times 10^{-21} \frac{5}{K}$ 

= 710,62134 × 103 Pa ~ 7,1 × 105 Pa