Tilstandslikning

$$\frac{p_1 \cdot V_1}{T_1} = \frac{p_2 \cdot V_2}{T_2}$$

$$\frac{pV}{T} = N \cdot k$$

6.26

$dm^3 = 0{,}1^3\ m^3 = 0{,}001\ m^3 = 10^{-3}\ m^3$

a) $$N = \frac{p \cdot V}{k \cdot T} = \frac{30\,[kPa] \cdot 12\,[dm^3]}{1{,}38 \cdot 10^{-23}\left[\frac{J}{K}\right] \cdot 240\,[K]}$$

k, Pa

$$\frac{30 \cdot 10^3 \left[\frac{N}{m^2}\right] \cdot 12 \cdot 10^{-3}\,[m^3]}{1{,}38 \cdot 10^{-23}\left[\frac{J}{K} \cdot K\right] \cdot 240} = \frac{30 \cdot 12}{1{,}38 \cdot 240 \cdot 10^{-23}}$$

$N \cdot m$

$$N = 1{,}087 \cdot 10^{23}$$

b) $$\rho = \frac{m}{V}$$ ← massen til N_2 gassen

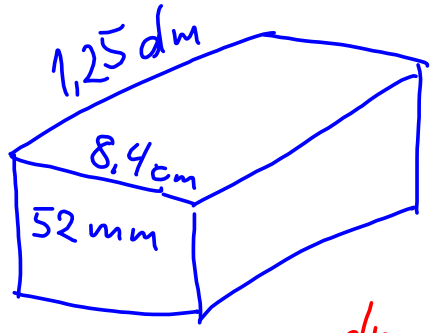
N_2-molekyl : $2 \cdot N = 2 \cdot 14{,}01\,[u] = 28{,}02\,[u]$

$$\rho = \frac{28{,}02\,[u]\ 1{,}66 \cdot 10^{-27}\left[\frac{kg}{u}\right] \cdot 1{,}087 \cdot 10^{23}}{12 \cdot 10^{-3}\,[m^3]}$$

$$\rho = \frac{28{,}02 \cdot 1{,}66 \cdot 1{,}087 \cdot 10^{-27+23}\left[\frac{u \cdot kg}{u}\right]}{12 \cdot 10^{-3}\,[m^3]}$$

$$= \frac{50{,}56 \cdot 10^{-4}}{12 \cdot 10^{-3}}\left[\frac{kg}{m^3}\right] = 0{,}42\left[\frac{kg}{m^3}\right]$$

6.301



dm cm mm

$$V = 1{,}25 \cdot 0{,}1\,[m] \cdot 8{,}4 \cdot 0{,}01\,[m] \cdot 52 \cdot 0{,}001\,[m]$$

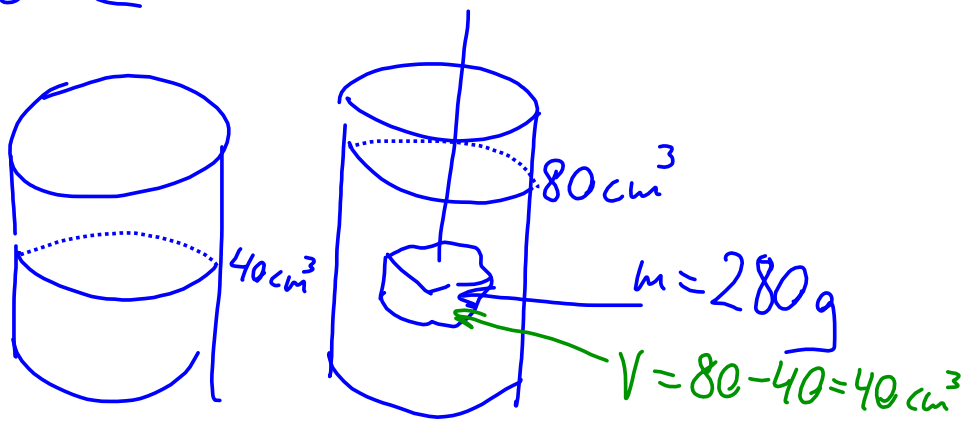
$$= 1{,}25 \cdot 8{,}4 \cdot 52 \cdot 10^{-1} \cdot 10^{-2} \cdot 10^{-3}\,[m^3]$$

$10^{-1-2-3} = 10^{-6}$

$$= 546 \cdot 10^{-6}\,[m^3]$$

$$\rho = \frac{m}{V} = \frac{354 \cdot 10^{-3}\,[kg]}{546 \cdot 10^{-6}\,[m^3]} = 0{,}648 \cdot 10^{3}\left[\frac{kg}{m^3}\right]$$

6.302



$$\rho = \frac{m}{V} = \frac{0{,}280\,[\text{kg}]}{40 \cdot (0{,}01)^3\,[\text{m}^3]} = 7000\left[\frac{\text{kg}}{\text{m}^3}\right]$$

$$\text{cm}^3 = 0{,}01^3\,\text{m}^3 = (10^{-2})^3\,\text{m}^3 = 10^{-6}\,\text{m}^3$$

$$\rho = \frac{m}{V} = \frac{280\,[\text{g}]}{40\,[\text{cm}^3]} = 7{,}0\left[\frac{\text{g}}{\text{cm}^3}\right]$$

6.304

$\rho = 950 \frac{kg}{m^3} = \frac{m}{V}$

$d = 0{,}50\ mm \Rightarrow r = \frac{d}{2} = \frac{0{,}50}{2}\ mm = 0{,}25 \cdot 10^{-3}\ m$

Volum av 100m sylinder

$V = \pi r^2 \cdot h = \pi \cdot (0{,}25 \cdot 10^{-3})^2\ m^2 \cdot 100\ m$

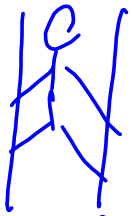
$= \pi \cdot 6{,}25 \cdot 10^{-6} \cdot m^3$

$m = \rho \cdot V = 950 \frac{kg}{m^3} \cdot \pi \cdot 6{,}25 \cdot 10^{-6}\ m^3 = 0{,}0186\ kg$

$= 19\ g$

6.312

$m = 70\ kg$



A (for hver) $4{,}0\ cm^2$ → Totalt areal $2 \cdot 4{,}0\ cm^2 = 8{,}0\ cm^2$

$$p = \frac{F}{A_T} = \frac{G}{A_T} = \frac{m \cdot g}{A_T} = \frac{70\,[kg]\ 9{,}81\,[m/s^2]}{8{,}0 \cdot 10^{-4}\,[m^2]}$$

$$= \frac{686{,}7}{8{,}0} \cdot 10^4 = 85{,}8 \cdot 10^4$$

$= 0{,}86\ MPa$

$= 858\ kPa$

$cm = 0{,}01\ m$

$cm^2 = 0{,}01^2\ m^2$

$(10^{-2})^2\ m^2 = 10^{-4}\ m^2$

6.323