I Einführung

I.1 Grundbegriffe

$m = 5\ kg$

SI Einheiten

Genauigkeit $4{,}5\ kg < m < 5{,}5\ kg$

$m = 5{,}0\ kg \longrightarrow 4{,}95\ kg < m < 5{,}05\ kg$

⇓

2 sign. Stellen
1 NK Stelle

$5{,}00\ kg \rightarrow$ 3 sign. Stellen
2 NK Stellen

$d = 10\ km \rightarrow d = 10 \cdot 10^3\ m$

10.000 m

10.000 m

$\rightarrow d = 0{,}00010 \cdot 10^{-5}\ km$

2 sign. Stellen

Addition / Subtraktion: NK Stellen

$l_1 = 2\ m$

$l_2 = 35\ cm = 0{,}35\ m$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} l_1 + l_2 = 2{,}35\ m$

$2\ m$

Multiplikation / Division: sign. Stellen

$l = 2\ m$

$b = 35\ cm = 0{,}35\ m$

$\left.\begin{array}{l} \\ \\ \end{array}\right\} A = l \cdot b = 2\ m \cdot 0{,}35\ m$

$= 0{,}70\ m^2$

$= 0{,}7\ m^2$

$T = 1^\circ C \Rightarrow T = (273{,}15 + 1)\ K = 274{,}15\ K$

$= 274\ K$

$m = 2{,}3462\ kg \rightarrow 2{,}35\ kg$

$2{,}346\ kg$

$m = 2{,}365\ kg \rightarrow 2{,}36\ kg$

$m = 2{,}360\ \text{kg} \rightarrow 2{,}36\ \text{kg}$

"round-to-even"
(gerade Zahl)

$m = 2{,}375\ \text{kg} \rightarrow 2{,}38\ \text{kg}$

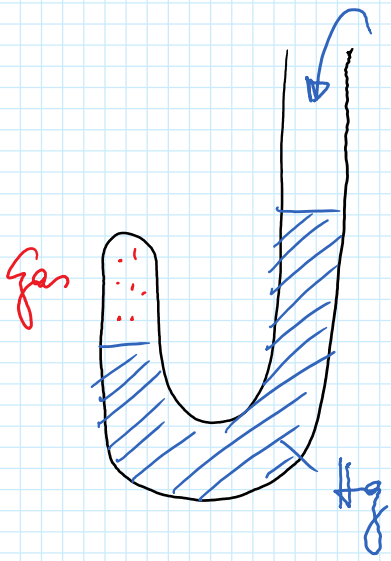
$m = 2{,}3650184\ \text{kg} \rightarrow 2{,}37\ \text{kg}$

II Gase

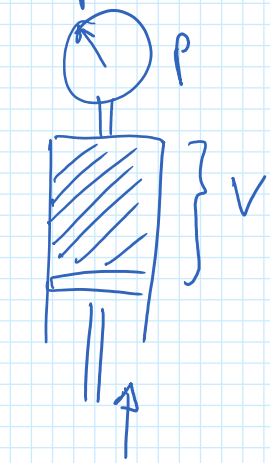
II.1 Historisches

Robert Boyle (17. Jahrh.)

Gasdruck = "Spring of the air"



Exp.:



#9

V	V		p
120 ml	V_0	1	1 bar
100 ml	$\frac{5}{6} V_0$	$\frac{6}{5}$	1,25 bar
80 ml	$\frac{2}{3} V_0$	$\frac{3}{2}$	1,5 bar
60 ml	$\frac{1}{2} V_0$	2	1,9 bar

$$\Rightarrow p \sim \frac{1}{V}$$

Boyle'sches Gesetz: $\boxed{pV = \text{const}}$

$T = \text{const}$

Isotherme = const

Gay-Lussac

(Anfang 19. Jhdt.)

$V = V_0 \left(1 + \alpha \cdot T(^\circ C)\right)$ $\quad (p = \text{const})$

$\frac{\partial V}{\partial T(^\circ C)} = V_0 \cdot \alpha$

$f(x, y) = x^2 + 2y$

$\partial T(°C)$

$$\alpha = \frac{1}{V_0}\left(\frac{\partial V}{\partial T(°C)}\right)_p$$

$p = \text{const}$

$$\frac{\partial f}{\partial x} = 2x$$

$$\frac{\partial f}{\partial y} = 2$$

$$\alpha = \frac{1}{267°C} \quad (\text{Gay-Lussac})$$

$$\alpha = \frac{1}{273{,}15°C}$$

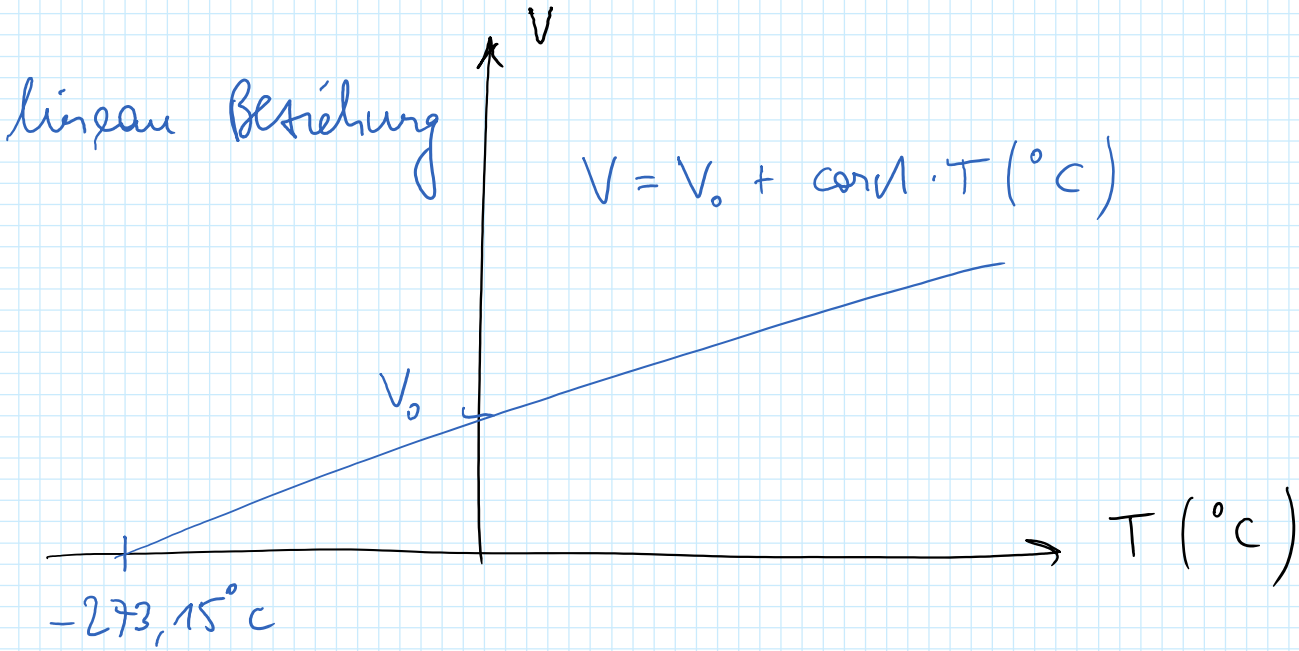
$$V = V_0\left(1 + \frac{T(°C)}{273{,}15°C}\right)$$

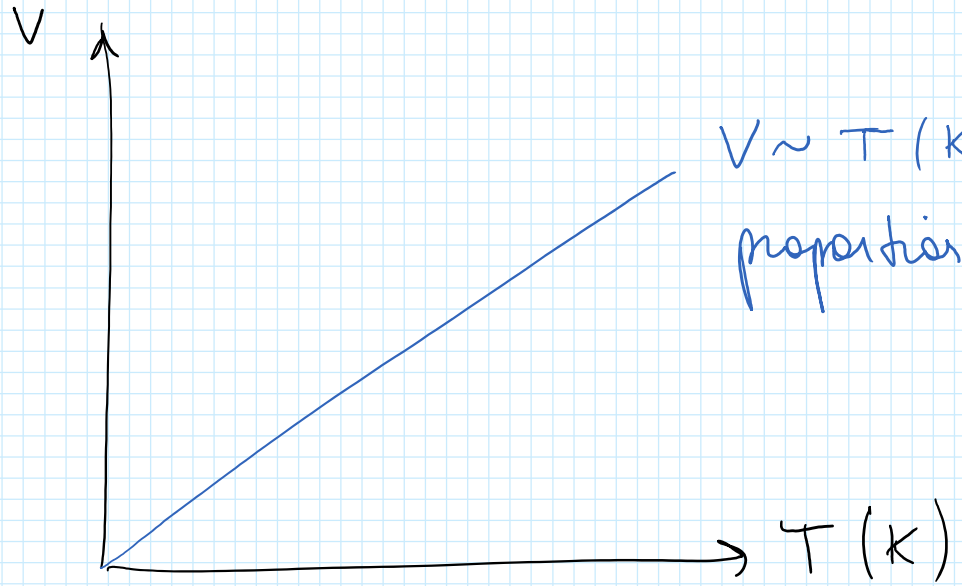
$$V = \frac{V_0}{273{,}15°C}\left(273{,}15°C + T(°C)\right)$$

absolute Temperatur (K) !!

$$V = \frac{V_0}{273{,}15\,K}\,T(K)$$

V

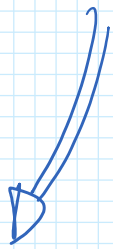




II.2 Ideales Gas

	fest	flüssig	gasförmig
Form	formbeständig	nicht formbeständig	keine Form (füllt jeden Raum aus)

			kaum aus)
Oberfläche	klare Oberfläche	veränderliche Oberfläche	keine Oberfläche
Dichte	$\approx 1 \frac{g}{cm^3}$	$\approx 1 \frac{g}{cm^3}$	$\approx 10^{-3} \frac{g}{cm^3}$
Wechselwirkung zwischen Teilchen	stark	etwas geringer	schwache Wechselwirkung



Thermodynamik