De Gaswetten

De algemene gaswet

Fietsband oppompen

Bron: Dbmpictures

Weerballon

Bron:Thuresson

p, V en T wijzigen

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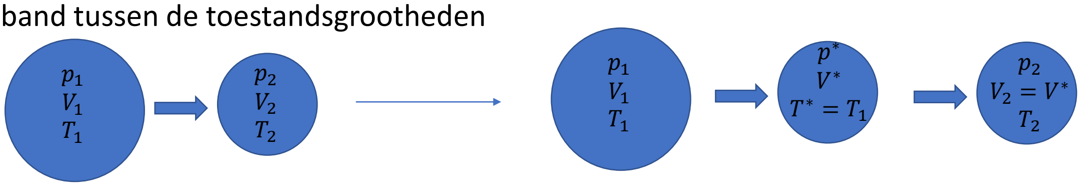
Verband tussen de toestandsgrootheden



1ste stap: Boyle-Mariotte: $p_1 \cdot V_1 = p^* \cdot V^*$ $\quad p^* = \frac{V_1}{V^*} \cdot p_1$

2de stap: Gay-Lussac: $\frac{p_2}{T_2} = \frac{p^*}{T^*}$ $\quad \frac{p_2}{T_2} = \frac{V_1}{V^*} \cdot p_1 \cdot \frac{1}{T^*}$ $\quad \frac{p_2}{T_2} = \frac{V_1}{V_2} \cdot \frac{p_1}{T_1}$

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

$$\boxed{\frac{p \cdot V}{T} = \text{constante}} \qquad \boxed{\frac{p_1 \cdot V_1}{T_1} = \frac{p_2 \cdot V_2}{T_2}}$$

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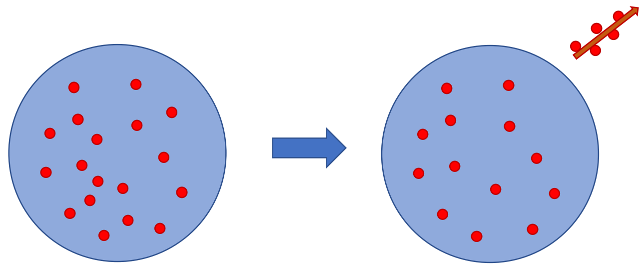

Stofhoeveelheid n : invloed op de druk $\frac{p \cdot V}{T} \sim n$ $\frac{p \cdot V}{T} = \text{constante} \cdot n$

$$\boxed{\frac{p \cdot V}{T} = n \cdot R}$$

$$\boxed{p \cdot V = n \cdot R \cdot T}$$

R is de algemene gasconstante

$$R = 8{,}31 \frac{\text{J}}{\text{K} \cdot \text{mol}}$$

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Gaswet bij constante druk

$$p \cdot V = n \cdot R \cdot T$$

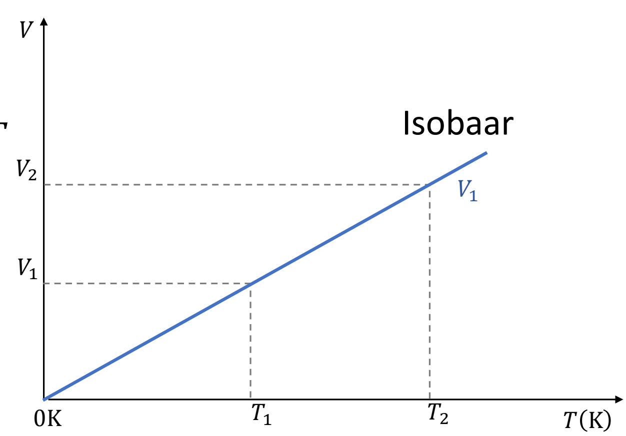
Als druk constant is

$$V = \frac{n \cdot R \cdot T}{p} = \frac{n \cdot R}{p} \cdot T = \text{constante} \cdot T$$

$V \sim T$

$$\boxed{\frac{V}{T} = constante}$$

$$\boxed{\frac{V_1}{T_1} = \frac{V_2}{T_2}}$$



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Normvolume van een gas

Als $n = 1{,}00 \text{ mol}$ $p_0 = 1{,}013\ x\ 10^5 \text{ Pa}$ $T_0 = 273{,}15 \text{ K}$

normtoestand   standaardomstandigheden

Het volume is dan het normvolume. V_0

$$\frac{p_0 \cdot V_0}{T_0} = n \cdot R \qquad V_0 = \frac{n \cdot R \cdot T_0}{p_0}$$

$$V_0 = \frac{1{,}00 \text{ mol} \cdot 8{,}31 \frac{\text{J}}{\text{K} \cdot \text{mol}} \cdot 273{,}15 \text{ K}}{1{,}013 \text{ x } 10^5 \text{ Pa}} = 22{,}4\ x\ 10^{-3} \text{ m}^3 \qquad = 22{,}4 \text{ l}$$