

The Gas Laws

Physics

The individual laws and the ideal gas equation in both forms.

The relationships and their constants.

Relationship	Holds constant
$p \propto 1/V$ (Boyle)	n, T
$V \propto T$ (Charles)	n, p
$p \propto T$ (Gay-Lussac)	n, V
$pV = nRT$	$R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$
$pV = NkT$	$k = 1.38 \times 10^{-23} \text{ J K}^{-1}$

$R = N_a k$. The molar gas constant is Avogadro's number times the Boltzmann constant — the same physics, counted differently.