The Greek alphabet

A	α	alpha	I	ι	iota	P	ρ	rho
B	β	beta	K	κ	kappa	Σ	σ	sigma
Γ	γ	gamma	Λ	λ	lambda	T	τ	tau
Δ	δ	delta	M	μ	mu	Υ	υ	upsilon
E	ϵ	epsilon	N	ν	nu	Φ	ϕ	phi
Z	ζ	zeta	Ξ	ξ	xi	X	χ	chi
H	η	eta	O	o	omicron	Ψ	ψ	psi
Θ	θ	theta	Π	π	pi	Ω	ω	omega

Physical constants

Avogadro constant	$N_{\mathrm{A}} = 6.022 \times 10^{23}\,\mathrm{mol}^{-1}$
Boltzmann constant	$k_{\mathrm{B}} = 1.381 \times 10^{-23}\,\mathrm{J\,K}^{-1}$
Planck constant	$h = 6.626 \times 10^{-34}\,\mathrm{J\,s}$
Elementary charge	$e = 1.602 \times 10^{-19}\,\mathrm{C}$
Ideal gas constant	$R = 8.314\ \mathrm{J\,K}^{-1}\mathrm{mol}^{-1}$
Vacuum permittivity	$\epsilon_0 = 8.854 \times 10^{-12}\ \mathrm{J}^{-1}\,\mathrm{C}^2\,\mathrm{m}^{-1}$
Speed of light (vacuum)	$c = 2.998 \times 10^{8}\,\mathrm{m\,s}^{-1}$
Faraday constant	$F = e\,N_{\mathrm{A}} = 96.485\ \mathrm{kC\ mol}^{-1}$

General Thermodynamics

First Law: For a closed system, $\Delta U = q + w$. Here ΔU is the change in internal energy of a system, w is the work done on the system, and q is the heat energy transferred to the system.

Enthalpy: $H = U + pV$ where U = internal energy, p=pressure and V = volume.

Heat capacity at constant volume: $C_V = \left(\frac{\partial U}{\partial T}\right)_V$

Heat capacity at constant pressure: $C_p = \left(\frac{\partial H}{\partial T}\right)_p$
In general C_p depends upon T. Values of C_p at temperatures not much different from room temperature can be estimated from

$$C_p = a + bT + \frac{c}{T^2}$$

where a, b and c are experimentally determined constants.

Second Law of thermodynamics: During a spontaneous change, the total entropy of an isolated system and its surroundings increases: $\Delta S > 0$. For a reversible process, at constant temperature, T, change in entropy

$$\Delta S = \frac{q_{rev}}{T}$$

where $q_{\text{rev}} =$ energy reversibly transferred as heat.

Boltzmann formula: $S = k_B \ln W$ where $W =$ 'weight' of the most probable configuration of the system and k_B is the Boltzmann constant.

Helmholtz energy: $A = U - TS$.

Gibbs energy: $G = H - TS$.

Change in Gibbs energy: $\Delta G = \Delta H - T\Delta S$ (at constant temperature).

Entropy change for isothermal expansion of an ideal gas:

$$\Delta S = nR \ln \left(\frac{V_{\text{final}}}{V_{\text{initial}}}\right)$$

where V_{final} and V_{initial} are the final and initial volumes.

Gibbs-Helmholtz equation: $\left(\frac{\partial}{\partial T}\left(\frac{\Delta G}{T}\right)\right)_p = -\frac{\Delta H}{T^2}$.