$$= -\int P_{ext}\, dV \qquad ; \qquad = \int \frac{dq_{rev}}{T}$$

$$= \frac{\Delta H}{T} \qquad ; \qquad = nC_p\Delta T$$

$$= \frac{\Delta E}{T} \qquad ; \qquad = C_v + R$$

$$= \Delta H - T\Delta S \qquad ; \qquad = \Delta S_{surr.} + \Delta S_{sys.}$$

$$= k_b \ln\Omega \qquad ; \qquad = nC_p\ln\left(\frac{T_2}{T_1}\right)$$

$$= \frac{q_{rev}}{T} \qquad ; \qquad = -\frac{\Delta H}{T}$$

$$= w\ (\text{max-other}) \qquad ; \qquad = nC_v\ln\left(\frac{T_2}{T_1}\right)$$

$$= \left(\frac{\Delta H^o}{R}\right)\left(\frac{T_2 - T_1}{T_2 T_1}\right) = \left(\frac{\Delta H^o}{R}\right)\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$

$$= \Delta G^o + RT\ln\{Q\} \qquad ; \qquad = -RT\ln\{K_{eq}\}$$

Bond Energies (kJ/mol)

C–C	350	C=C	614
N-H	391	O-H	467
H-H	432	F-F	154

Atomic Weights

H	1.0	O	16.0
C	12.0	Cl	35.5
N	14.0		

Thermochemical Data at 25°C

	$\Delta H^o_f\ \left(\frac{kJ}{mol}\right)$	$\Delta G^o_f\ \left(\frac{kJ}{mol}\right)$	$S^o\ \left(\frac{J}{mol\,K}\right)$
$N_2H_4(l)$	??	??	121.0
$H_2O(g)$	-241.8	-229.0	188.7
$NO_2(g)$	33.2	51.3	240.0
$H_2(g)*$	??	??	131.0
$O_2(g)*$	??	??	205.0