Chemistry 172

$I\Sigma\Pi$

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Entropy Equations

Table 1: Equations for Entropy

Vary Temperature	Vary Pressure	Vary Volume
$\Delta S = C_{\mathrm{v/p}} \ln \frac{T_\mathrm{f}}{T_\mathrm{i}}$	$\Delta S = nR \ln \frac{P_\mathrm{i}}{P_\mathrm{f}}$	$\Delta S = nR \ln \frac{V_\mathrm{f}}{V_\mathrm{i}}$

$$S = k \ln W$$

Enthalpy Equations

$$\begin{aligned}
\Delta H &= \Delta U + P\Delta V \\
\Delta H &= \Delta U + \Delta nRT \\
\Delta H &= \frac{C_\mathrm{p}}{\Delta T} \\
\Delta U &= \frac{C_\mathrm{v}}{\Delta T} \\
C_p &= C_v + nR \\
w_\mathrm{sys} &= -\int_{V_\mathrm{f}}^{V_\mathrm{i}} P dV
\end{aligned}$$

Table 2: Equations for Work

Constant Pressure	Constant Temperature	Constant Volume
$w_\mathrm{sys} = -P_\mathrm{ext}\Delta V$	$w_\mathrm{sys} = -nRT \ln \frac{V_\mathrm{f}}{V_\mathrm{i}}$	0

Table 3: Ideal Molecules

Molecule	Translation	Rotation	C_v	C_p	Internal Energy
Atom	3	0	$\frac{3}{2}R$	$\frac{5}{2}R$	$\frac{3}{2}\ nRT$
Linear	3	2	$\frac{5}{2}R$	$\frac{7}{2}R$	$\frac{5}{2}\ nRT$
Non-Linear	3	3	3R	4R	3 nRT