8.2 Overview reversible ideal processes

Isothermal	$\mathrm{d}\mathbf{T} = \mathbf{0}$	ideal	
Energy	$\mathrm{d}U = \delta q + \delta w$	$U = U(T) \Rightarrow \mathrm{d}U = 0$	$\Delta U = 0$
Work	$\delta w = -p\,\mathrm{d}V$	$\delta w = -\frac{nRT}{V}\,\mathrm{d}V$	$w = -nRT\ln\frac{V_f}{V_i}$
Heat	$\delta q = -\delta w$		$q = nRT\ln\frac{V_f}{V_i}$
Enthalpy	$\mathrm{d}H = \mathrm{d}(U + pV)$ $= \mathrm{d}(pV)$	$\mathrm{d}(pV) = \mathrm{d}(nRT) = 0$	$\Delta H = 0$
Entropy	$\mathrm{d}S = \frac{\delta q_{\mathrm{rev}}}{T} = -\frac{\delta w}{T}$		$\Delta S = nR\ln\frac{V_f}{V_i}$

Isochoric	$\mathrm{d}\mathbf{V} = \mathbf{0}$		
Work	$\delta w = -p\,\mathrm{d}V = 0$		$w = 0$
Heat	$\delta q = C_V\,\mathrm{d}T$		$q = C_V\Delta T$
Energy	$\mathrm{d}U = \delta q + \delta w$ $= \delta q = \mathrm{d}q$		$\Delta U = C_V\Delta T$
Enthalpy	$\mathrm{d}H = \mathrm{d}(U + pV)$ $= C_V\,\mathrm{d}T + \mathrm{d}(pV)$	$\mathrm{d}(pV) = \mathrm{d}(nRT)$ $C_p = C_V + nR$	$\Delta H = C_p\Delta T$
Entropy	$\mathrm{d}S = \frac{\delta q_{\mathrm{rev}}}{T} = \frac{C_V}{T}\,\mathrm{d}T$		$\Delta S = C_V\ln\frac{T_f}{T_i}$

Isobaric	$\mathrm{d}\mathbf{p} = \mathbf{0}$		
Work	$\delta w = -p\,\mathrm{d}V$		$w = -p\Delta V$
Heat	$\delta q = C_p\,\mathrm{d}T = \mathrm{d}q$		$q = C_p\Delta T$
Enthalpy	$\mathrm{d}H = \delta q + \delta w + p\,\mathrm{d}V$ $= \delta q = \mathrm{d}q$		$\Delta H = C_V\Delta T$
Energy	$\mathrm{d}U = \mathrm{d}(H - pV)$ $= C_p\,\mathrm{d}T + \mathrm{d}(pV)$	$\mathrm{d}(pV) = \mathrm{d}(nRT)$ $C_V = C_p - nR$	$\Delta U = C_p\Delta T$
Entropy	$\mathrm{d}S = \frac{\delta q_{\mathrm{rev}}}{T} = \frac{C_p}{T}\,\mathrm{d}T$		$\Delta S = C_p\ln\frac{T_f}{T_i}$

Adiabatic	$\delta\mathbf{q} = \mathbf{0}$		
		$pV^\gamma = const$	
Heat	$\delta q = 0$		$q = 0$
Entropy	$\mathrm{d}S = 0$		$\Delta S = 0$
Work	$\delta w = -p\,\mathrm{d}V$	$\delta w = -p_i\left(\frac{V_i}{V}\right)^\gamma\mathrm{d}V$ $\Delta(pV) = nR\Delta T$	$w = C_V\Delta T$
Energy	$\mathrm{d}U = \delta w = \mathrm{d}w$		$\Delta U = C_V\Delta T$
Enthalpy	$\mathrm{d}H = V\,\mathrm{d}p$	$V\,\mathrm{d}p = V_0\left(\frac{p_0}{p}\right)^{\frac{1}{\gamma}}\mathrm{d}p$	$\Delta H = C_p\Delta T$