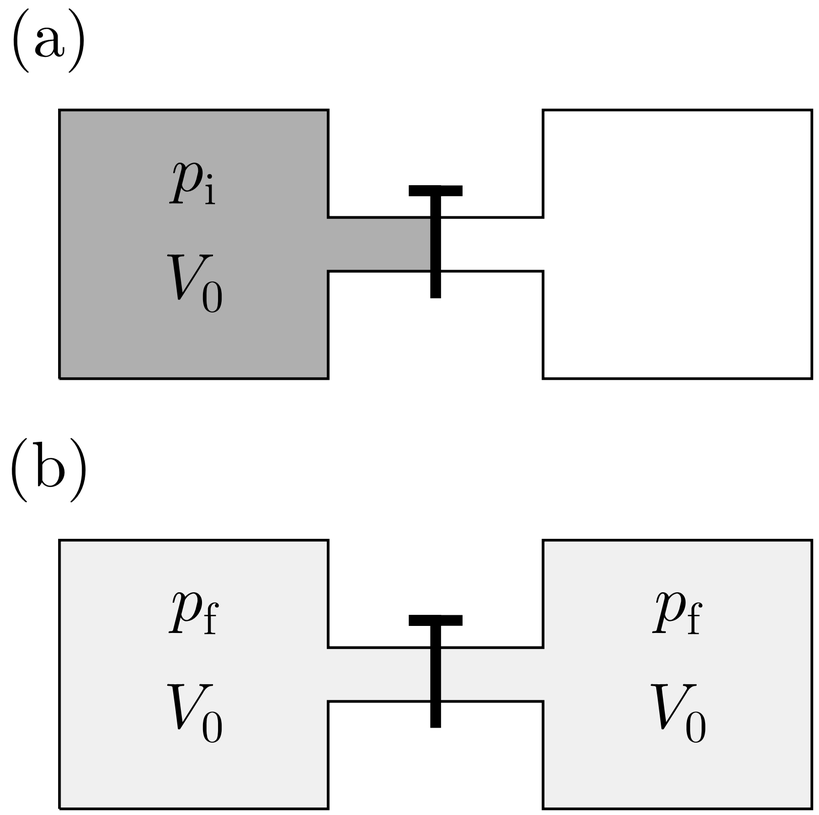
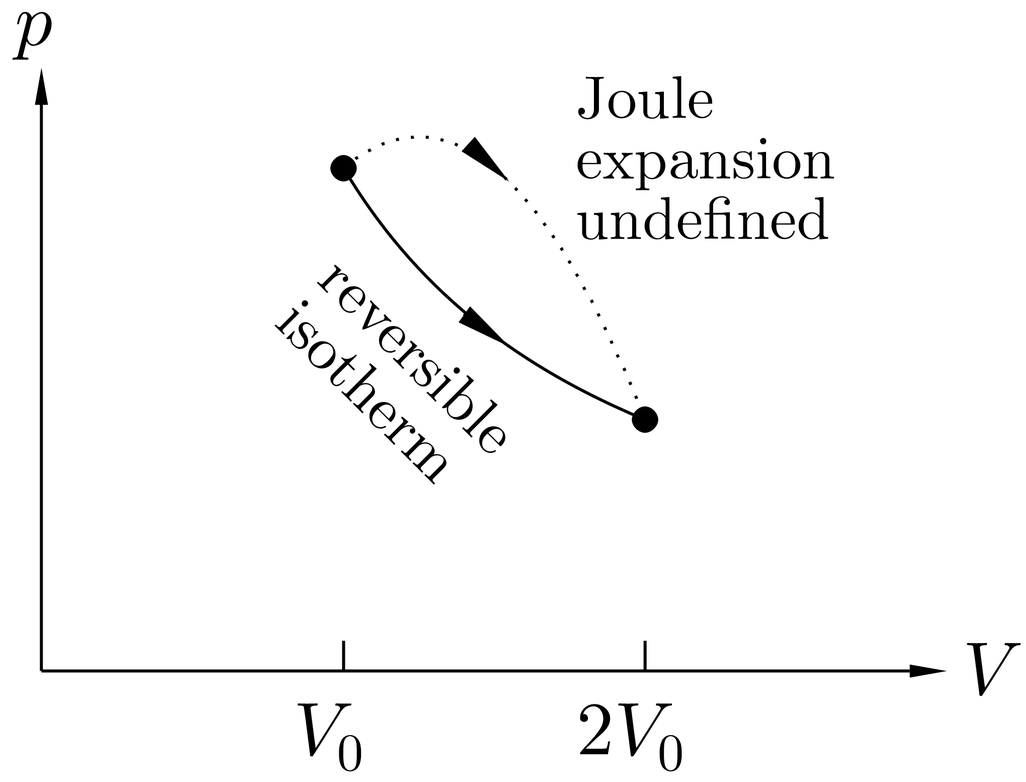
Calculating the change in entropy: thermodynamic considerations





Definitions of Thermodynamic Potentials

Function of state		Differential	Natural variables	First derivatives	
Internal energy	U	$\mathrm{d}U = T\mathrm{d}S - p\mathrm{d}V$	$U = U(S,V)$	$T = \left(\frac{\partial U}{\partial S}\right)_V,$	$p = -\left(\frac{\partial U}{\partial V}\right)_S$
Enthalpy	$H = U + pV$	$\mathrm{d}H = T\mathrm{d}S + V\mathrm{d}p$	$H = H(S,p)$	$T = \left(\frac{\partial H}{\partial S}\right)_p,$	$V = \left(\frac{\partial H}{\partial p}\right)_S$
Helmholtz function	$F = U - TS$	$\mathrm{d}F = -S\mathrm{d}T - p\mathrm{d}V$	$F = F(T,V)$	$S = -\left(\frac{\partial F}{\partial T}\right)_V,$	$p = -\left(\frac{\partial F}{\partial V}\right)_T$
Gibbs function	$G = H - TS$	$\mathrm{d}G = -S\mathrm{d}T + V\mathrm{d}p$	$G = G(T,p)$	$S = -\left(\frac{\partial G}{\partial T}\right)_p,$	$V = \left(\frac{\partial G}{\partial p}\right)_T$