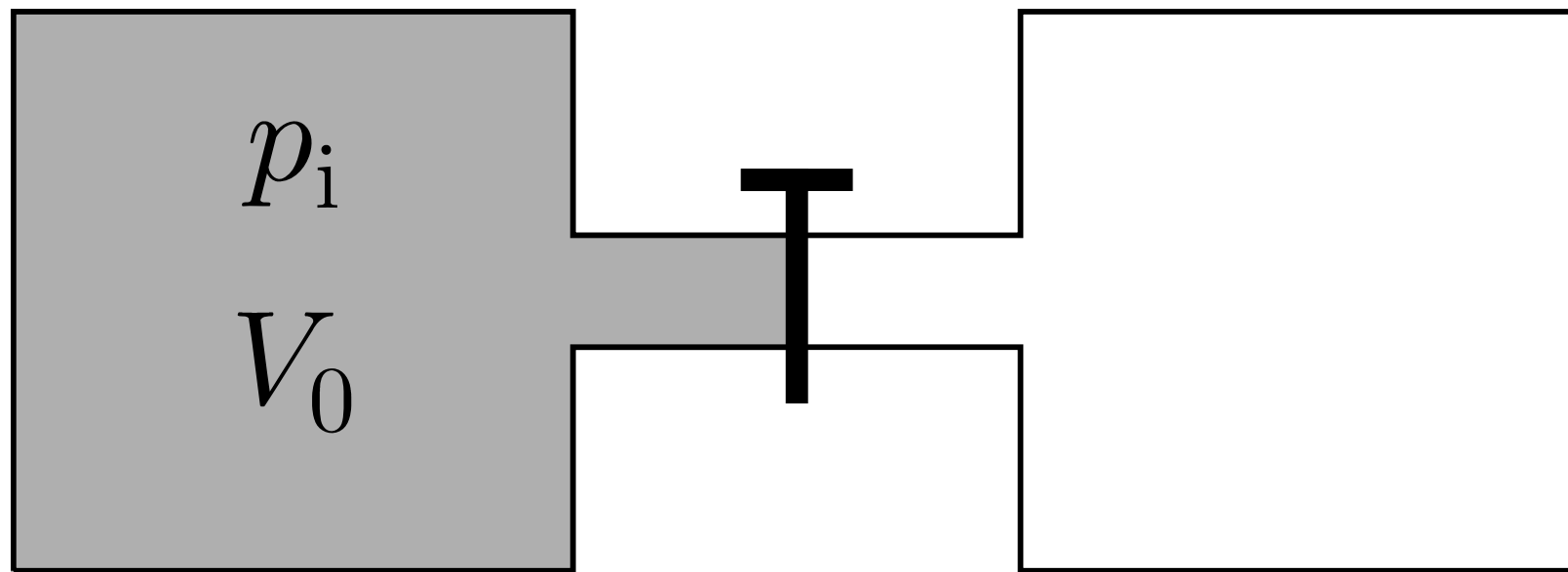


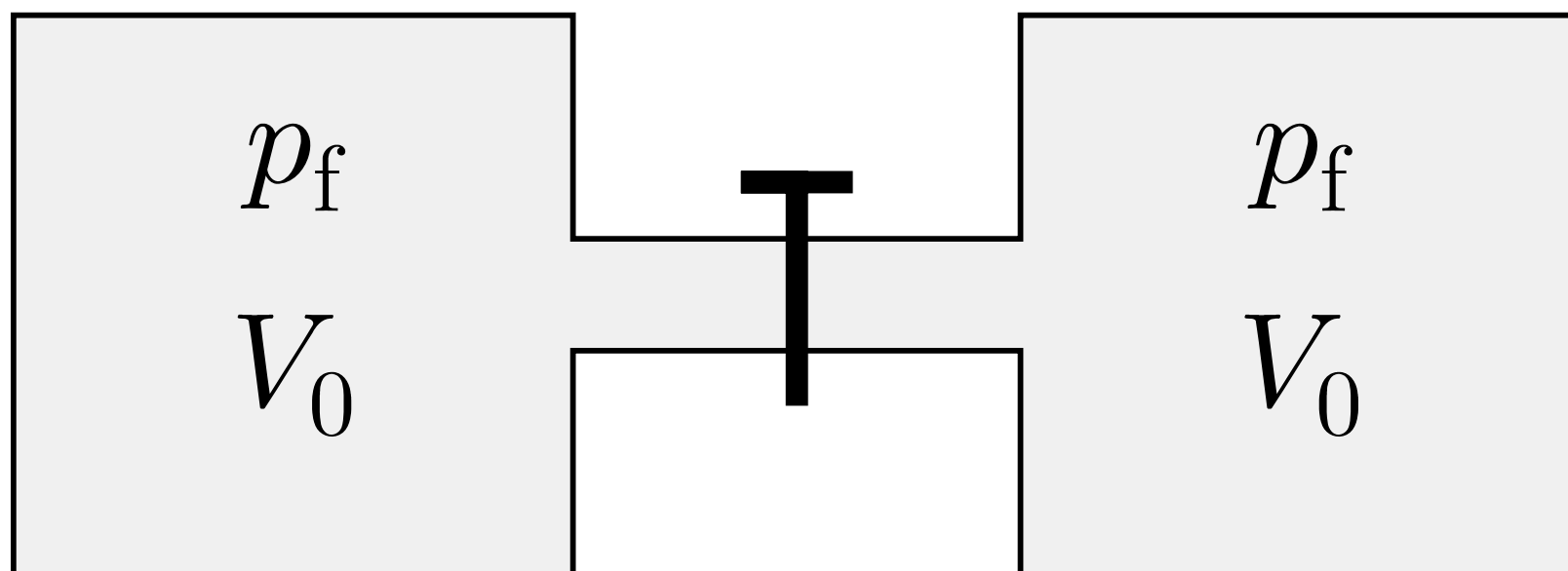
Joule Expansion

(a)



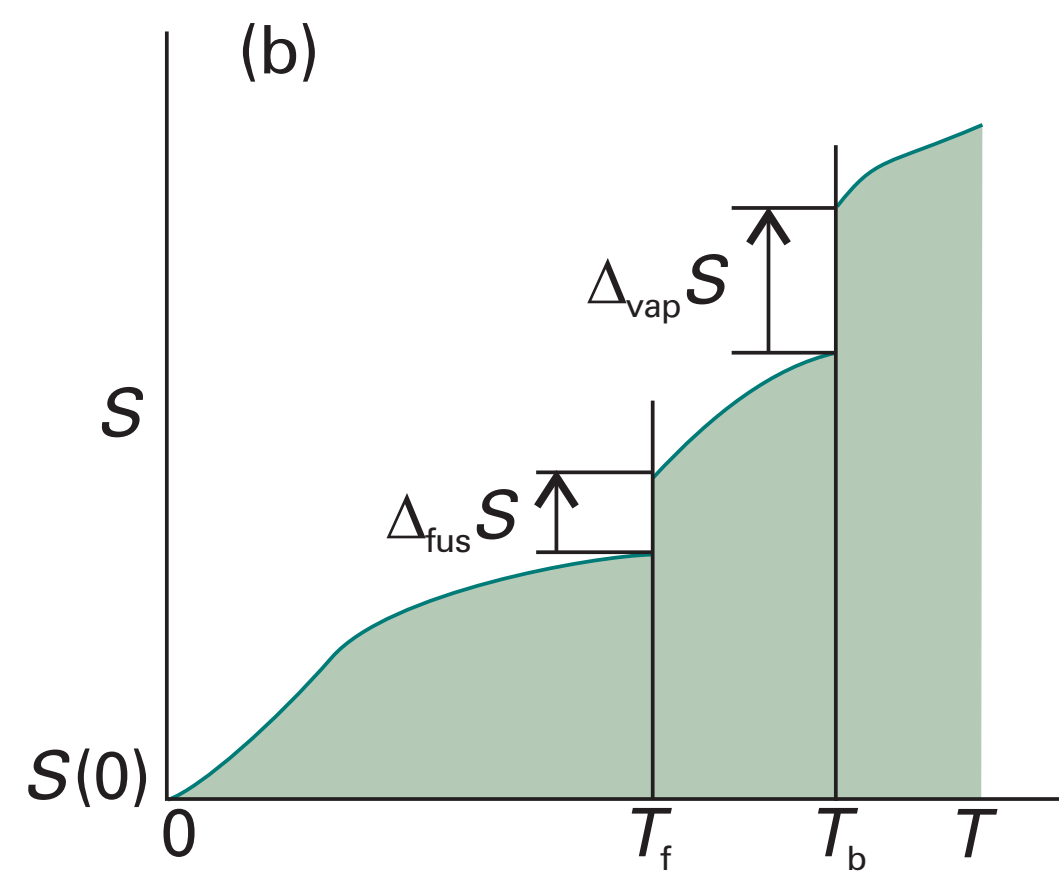
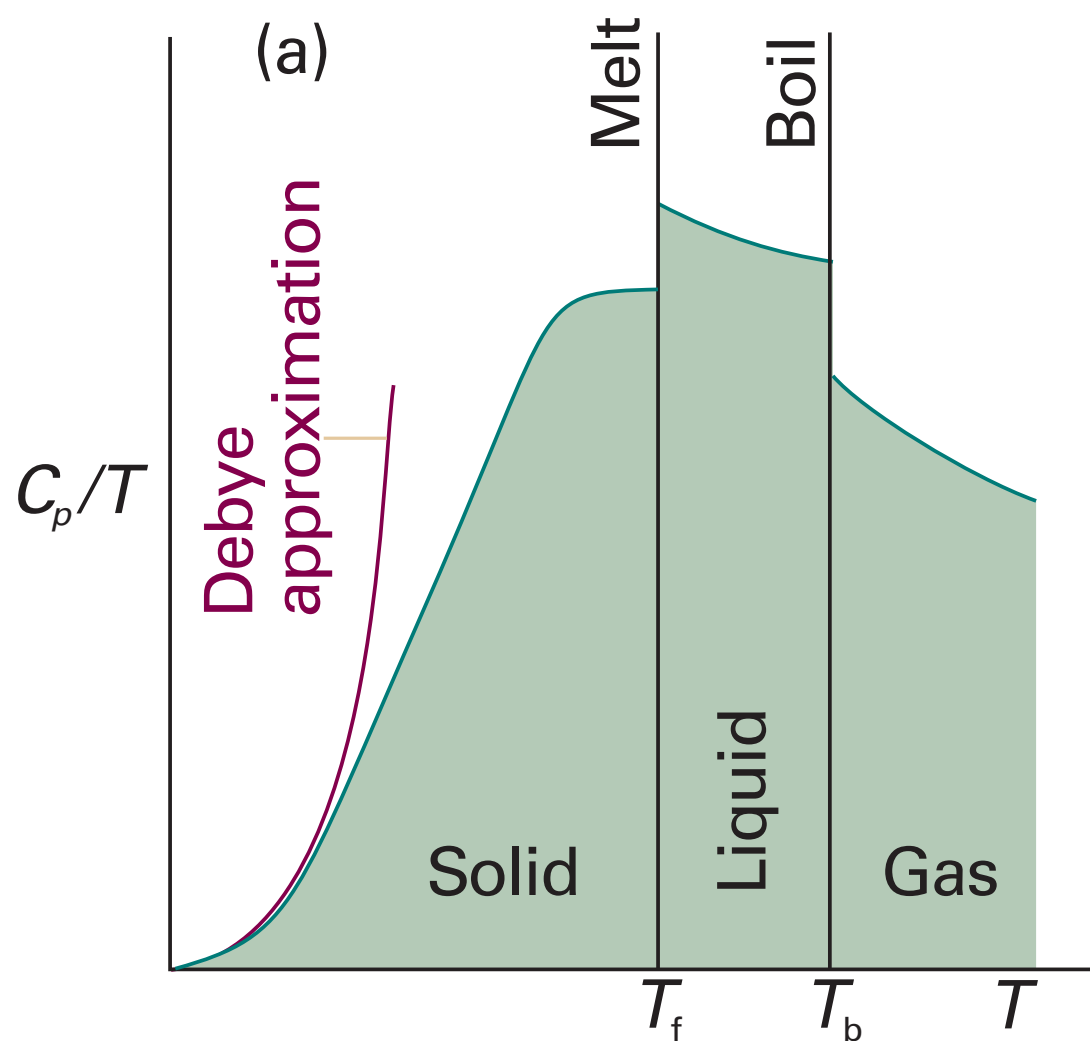
The expansion is a highly non-equilibrium process.

(b)



During the expansion no heat enters the system. Thus the energy initial equals the final energy

Entropy of Boiling Liquid Nitrogen



	$S_m^\ominus / (\text{J K}^{-1} \text{ mol}^{-1})$
Debye extrapolation	1.92
Integration, from 10 K to 35.61 K	25.25
Phase transition at 35.61 K	6.43
Integration, from 35.61 K to 63.14 K	23.38
Fusion at 63.14 K	11.42
Integration, from 63.14 K to 77.32 K	11.41

Total

79.8 J/mol K