

51. Since isothermal means constant temperature, then this would be a flat horizontal line on a T versus S graph (with T being the vertical axis). Since this concerns an ideal gas (also see Figure 21-3) then $\Delta E_{\text{int}} = 0$ (by Eq. 20-45), so this isothermal process would be a vertical line on an S versus E_{int} graph (with E_{int} being the horizontal axis). When $T = T_i$ Eq. 21-4 reduces to

$$S - S_i = nR \ln\left(\frac{V}{V_i}\right)$$

which is shown in the graph below for $n = 1$ mol, $V_i = 1 \text{ m}^3$, and $S_i = 10 \text{ J/K}$ (arbitrarily picked).

