4.8 A sample of 1.00 mol of a monatomic perfect gas with $C_{V,m} = \frac{3}{2}R$, initially at 298 K and 10 L, is expanded, with the surroundings maintained at 298 K, to a final volume of 20 L, in three ways: (a) isothermally and reversibly, (b) isothermally against a constant external pressure of 0.50 atm, (c) adiabatically against a constant external pressure of 0.50 atm. Calculate ΔS, ΔS_{sur}, ΔH, ΔT, ΔA, and ΔG for each path where the data permit.

4.24 A gaseous sample consisting of 1.00 mol molecules is described by the equation of state $pV_m = RT(1 + Bp)$. Initially at 373 K, it undergoes Joule–Thomson expansion from 100 atm to 1.00 atm. Given that $C_{p,m} = \frac{5}{2}R$, $\mu = 0.21$ K atm^{-1}, $B = -0.525(\text{K}/T)$ atm^{-1}, and that these are constant over the temperature range involved, calculate ΔT and ΔS for the gas.