

Solutions

2.1 A State a sign convention before using the first law. Here change in internal energy equals heat into the system minus work done by the system. Expansion work can reduce internal energy when no heat enters.

2.2 With work done by gas positive, $\Delta U = Q - W = 500 - 200 = 300$ J.

2.3 False. Adiabatic does not mean constant temperature. Use the stated sign convention; some courses write work done on the gas with the opposite sign.

2.4 adiabatic. adiabatic means A process with no heat transfer.

3.1 Compression has $Q=0, W=-150$ J, giving $+150$ J. Cooling has $Q=-40$ J, $W=0$, giving -40 J. Total change $= +110$ J. Keep one sign convention throughout.