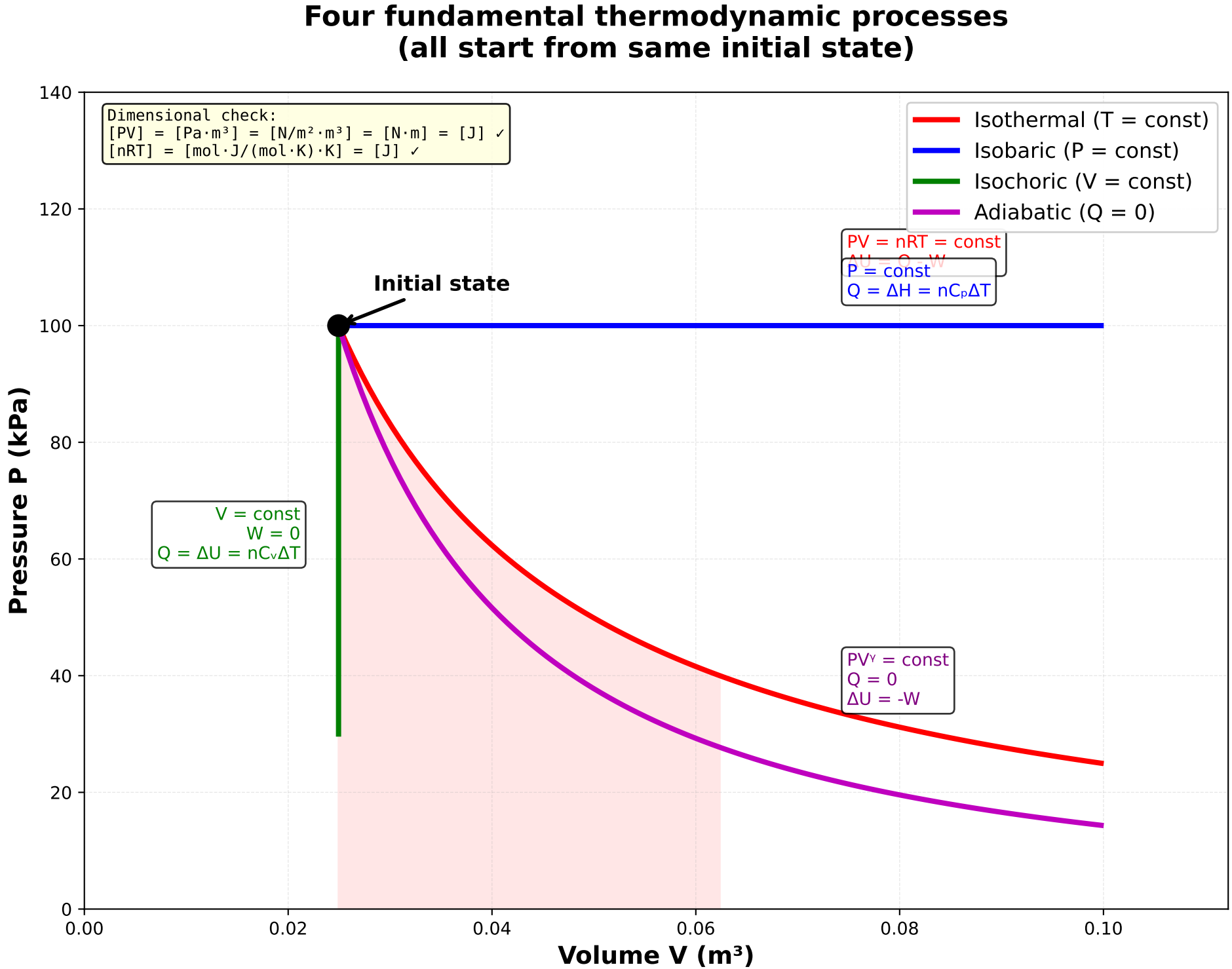
Four fundamental thermodynamic processes
(all start from same initial state)
Dimensional check:
[PV] = [Pa·m³] = [N/m²·m³] = [N·m] = [J] ✓
[nRT] = [mol·J/(mol·K)·K] = [J] ✓
Isothermal (T = const)
Isobaric (P = const)
Isochoric (V = const)
Adiabatic (Q = 0)
PV = nRT = const
ΔU = Q - W
P = const
Q = ΔH = nCₚΔT
Initial state
V = const
W = 0
Q = ΔU = nCᵥΔT
PVᵞ = const
Q = 0
ΔU = -W
Pressure P (kPa)
Volume V (m³)
0
20
40
60
80
100
120
140
0.00
0.02
0.04
0.06
0.08
0.10