

by Eq ① $W_{\text{isochoric}} = \int P \cdot dV = 0$

$W_{\text{isochoric}} = 0$ — ⑦

4. Adiabatic Process: $\Delta Q = 0$

Equation of state $PV^\gamma = K$ — ⑧

by Eq ⑧ $P = \frac{K}{V^\gamma}$ — ⑨

by Eq ① $W_{\text{adia}} = \int_{V_i}^{V_f} P dV = \int_{V_i}^{V_f} \frac{K}{V^\gamma} dV$

$W_{\text{adia}} = K \int_{V_i}^{V_f} V^{-\gamma} dV$ $\left\{ \int x^n dx = \frac{x^{n+1}}{n+1} \right.$

$= K \left[\frac{V^{-\gamma+1}}{(-\gamma+1)} \right]_{V_i}^{V_f}$

$\left. \begin{array}{l} P_i V_i^\gamma = K \\ P_f V_f^\gamma = K \end{array} \right\}$

$W_{\text{adia}} = K \left\{ \frac{V_f^{-\gamma+1}}{(-\gamma+1)} - \frac{V_i^{-\gamma+1}}{(-\gamma+1)} \right\}$