

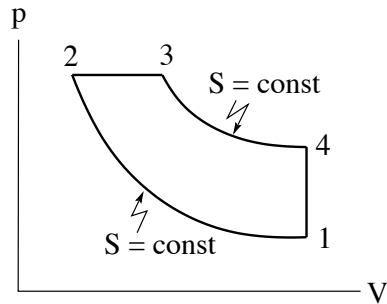
[tex16] Idealized Diesel cycle

Consider the four steps of the Diesel cycle for a classical ideal gas [$pV = nRT$, $U = C_V T$ with $C_V = \alpha nR$].

(a) Determine the heat transfer, ΔQ , the work performance, ΔW , and the change in internal energy, ΔU , for each of the four steps:

- 1 \rightarrow 2 adiabatic compression of air: $S = \text{const}$.
- 2 \rightarrow 3 isobaric expansion during explosion: $p = \text{const}$.
- 3 \rightarrow 4 adiabatic expansion after explosion: $S = \text{const}$.
- 4 \rightarrow 1 isochoric release of exhaust gas: $V = \text{const}$.

Calculate the efficiency η and express it as a function of the two parameters $K \equiv V_1/V_2$ and $L \equiv V_3/V_2$.



Solution: