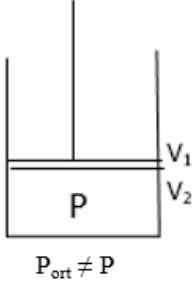


İzotermik genişleme ve sıkışmalar (Tersinmez veya tersinir)



T= sabit, izotermal

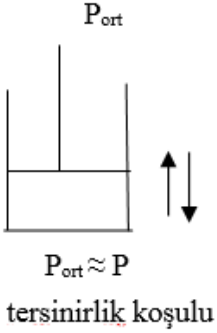
Tersinmez:

$P_{ort} > P$ veya $P_{ort} < P$ ise genişleme ve sıkışmalar tersinmez

$$\int_0^W \delta W = -P_{ort} \int_{V_1}^{V_2} dV$$

$$W_{iz} = -P_{ort} (V_2 - V_1)$$

Tersinir



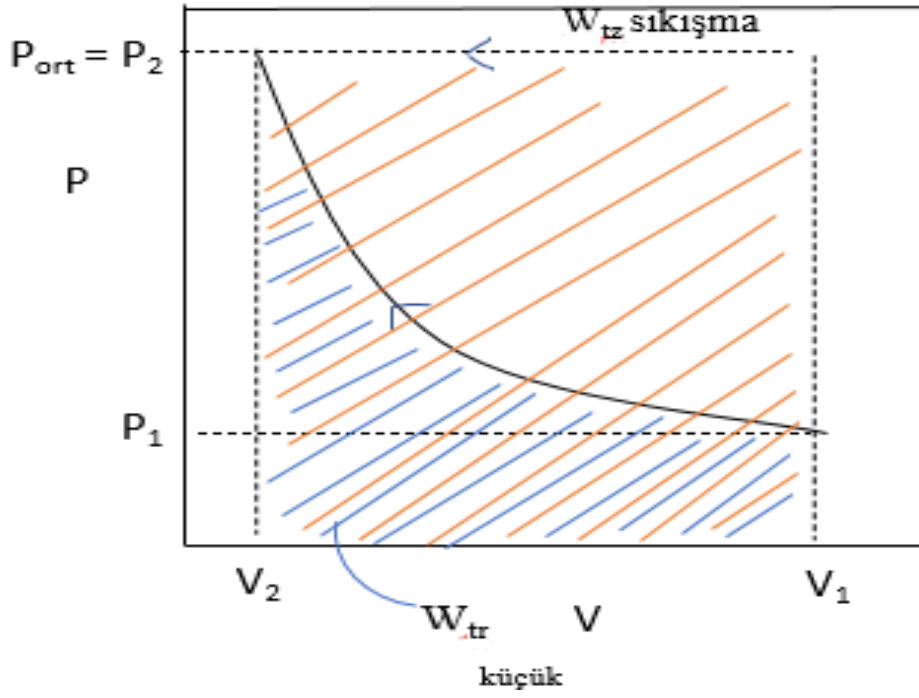
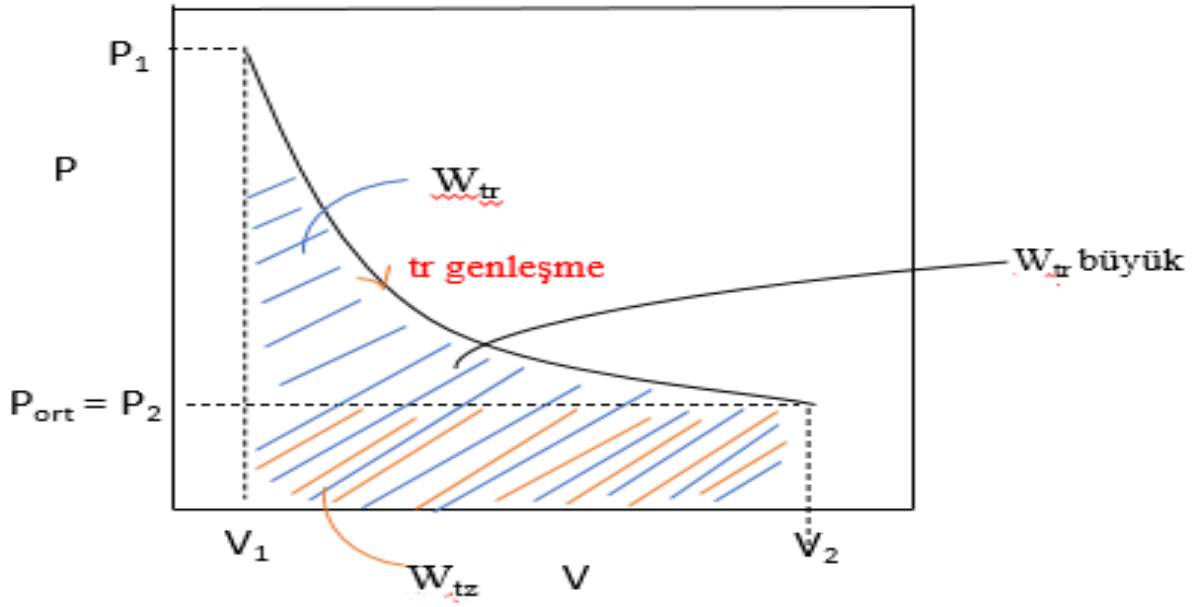
$$\delta W = -P_{ort} dV$$

$$= -PdV$$

$$= -\left(\frac{nRT}{V}\right) dV$$

$$\int_0^W \delta W = -nRT \int_{V_1}^{V_2} \frac{dV}{V}$$

$$W_{tr} = -nRT \ln V_2/V_1$$

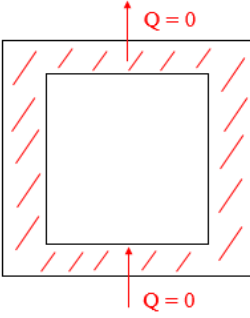


tz ve tr genişleme
 $|W_{tr}| > |W_{tz}|$

tz ve tr sıkışma
 $|W_{tr}| < |W_{tz}|$

adyabatik Sistemler

Tersinmez:



$$\delta U = \delta q + \delta W$$

$$\int_{U_1}^{U_2} dU = \int_0^W dW \quad \Longrightarrow \quad \Delta U = U_2 - U_1 = W$$

$$n=1 \text{ mol} \quad dU = C_v dT$$

$$n \text{ mol için} \quad du = nC_v dT$$

$$dU = \delta W$$

$$\int_{U_1}^{U_2} dU = nC_v \int_{T_1}^{T_2} dT = -P_{ort} dV$$

$$\Delta U = nC_v(T_2 - T_1) = -P_{ort}(V_2 - V_1)$$

$$P_2 V_2 = nRT_2$$

T_2 ve V_2 bulunur.

Tersinir:

$$dU = \delta W = -P_{ort} dV \quad P_{ort} \approx P_{sis}$$

$$dU = \delta W = -P_{sis} dV = -\frac{nRT}{V} dV$$

$$1 \text{ mol; } dU = C_v dT = -RT \frac{dV}{V} \quad \Longrightarrow \quad C_v \int_{T_1}^{T_2} \frac{dT}{T} = -R \int_{V_1}^{V_2} \frac{dV}{V}$$

$$n \text{ mol; } dU = nC_v dT = -nRT \frac{dV}{V} \quad \Longrightarrow \quad nC_v \int_{T_1}^{T_2} \frac{dT}{T} = -nR \int_{V_1}^{V_2} \frac{dV}{V}$$

$$\frac{T_2}{T_1} = \left(\frac{P_1}{P_2}\right)^{\frac{1-\gamma}{\gamma}}$$

$$\frac{T_2}{T_1} = \left(\frac{V_1}{V_2}\right)^{\gamma-1}$$

adyabatik tersinir olaylar için

$$P_1 V_1^\gamma = P_2 V_2^\gamma$$