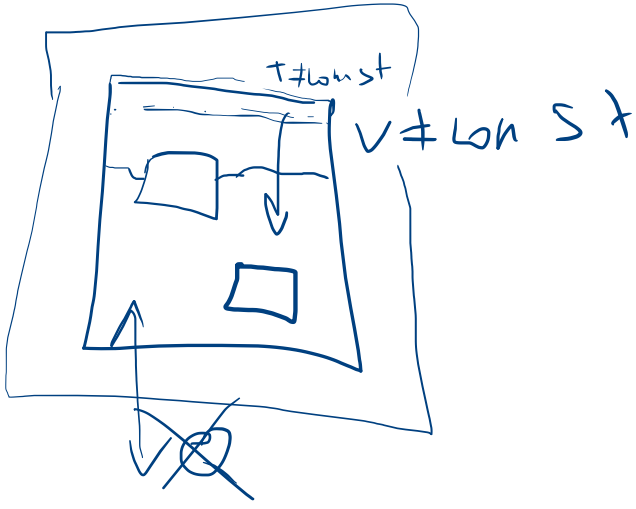
Изохорные процессы

$Q = 0$



$Q = \Delta U + A$

$\Delta U = -A$

$\frac{i}{2} \nu R dT = p dV$

$pV^{\gamma} = const$

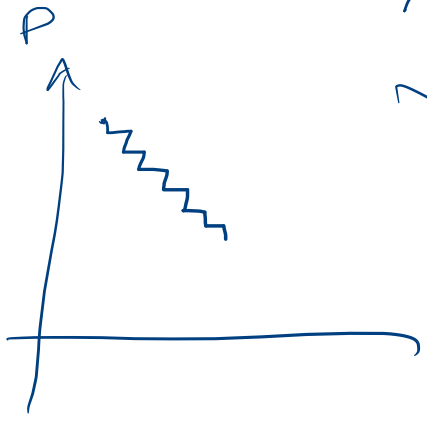
$Q = U + A$, $\quad dQ = \frac{1}{2} \nu R\, dT + P\, dV$ (C_v)

$\nu = \frac{m}{\mu}$

$PV = \nu RT$

$P = \nu \frac{RT}{V}$

$$dQ = C_v \frac{m}{\mu} dT + P\, dV$$

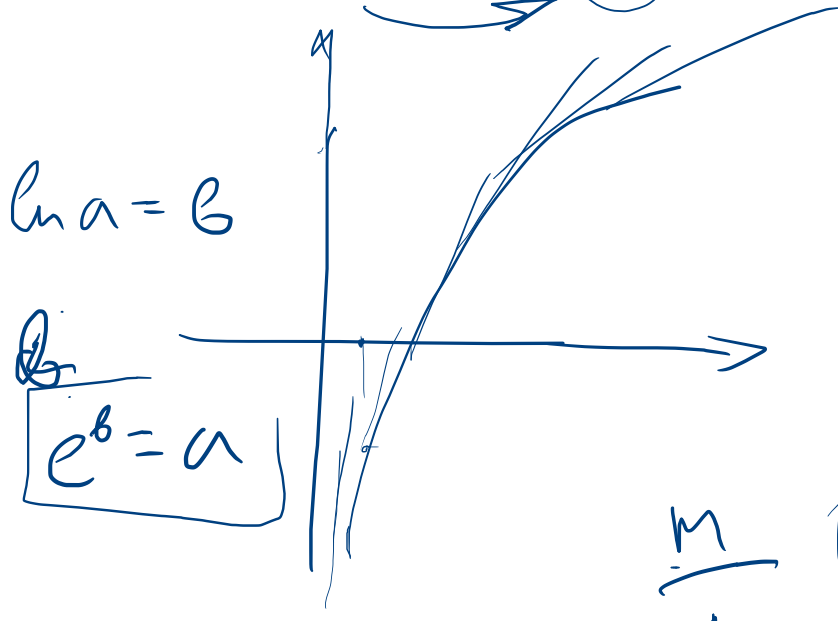


$$dQ = C_v \frac{m}{\mu} dT + \frac{\nu RT\, dV}{V} \quad | : T$$

$$\frac{m}{\mu} \frac{dT}{T} + \frac{\nu R\, dV}{C_v V} = 0$$

$$(\ln x)' = \frac{1}{x}$$

$$\frac{dx}{x}$$



$$\ln a = b$$

$$e^b = a$$

$$\frac{dx}{x} = d(\ln x)$$

$$\frac{m}{\mu} \ln T + \frac{R}{C_v} \ln V$$

$$y = e^t$$

$$\frac{m}{\mu}\left(\ln T + \frac{R}{C_v}\ln V\right) = 0$$

$$C_p - C_v = R$$

$$\gamma = \frac{C_p}{C_v} \quad \Big) \quad \Big) \; C_v - C_v = R$$

$$\frac{R}{C_v} = \gamma - 1$$

$$\ln T + (\gamma - 1)\ln V$$

$$\ln T + (\gamma - 1)\ln V = 0$$

$$\ln\left(T\, V^{(\gamma-1)}\right) = 0$$

$$\sim e^{0} = \left(T \cdot V^{(\gamma-1)}\right)$$

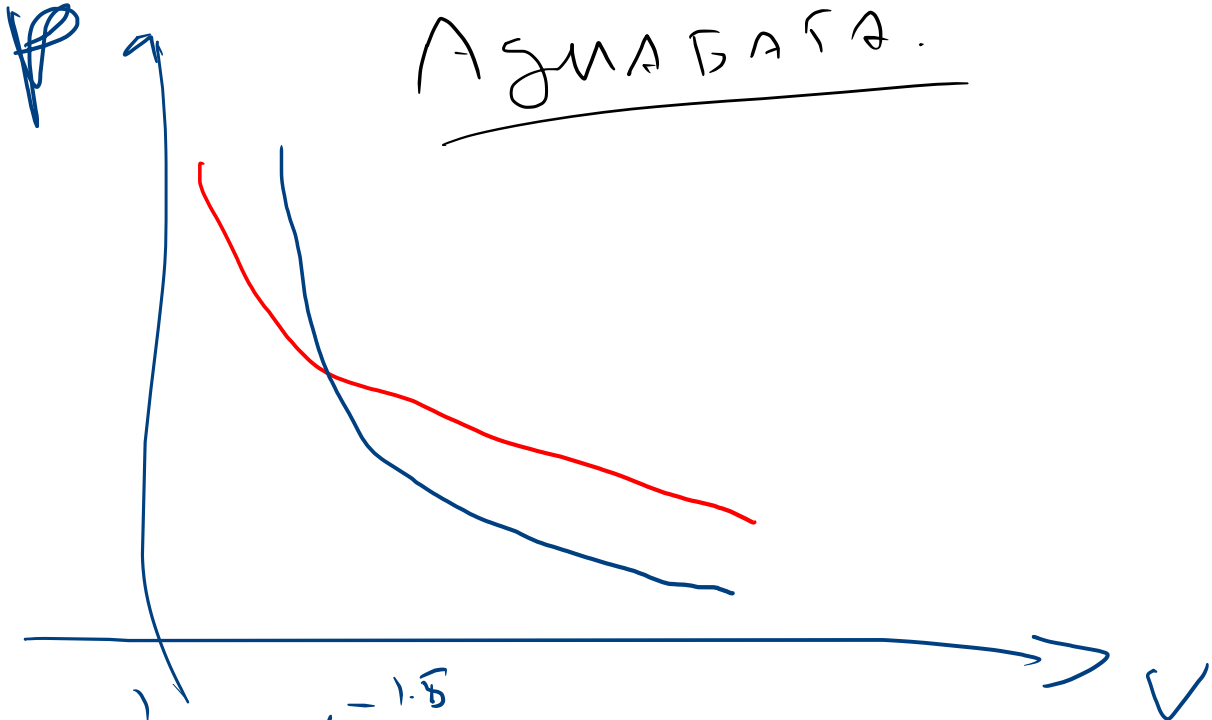
$$T = \frac{\mu}{m} P$$

$$c^\circ = \frac{pV}{mR} \cdot V^{\gamma-1} \cdot V^{\gamma}$$

$$\frac{c^\circ \cdot mR}{\mu} = \text{const} = pV^{\gamma}$$

$$p_1 V_1^{\gamma} = p_2 V_2^{\gamma}$$

Адиабата.



$$P = \frac{1}{V^{1.5}} = V^{-1.5}$$

$$P = \frac{1}{V^{\gamma}}$$

$T = const$

$$P = \frac{1}{V}$$

$$P = V^{-1}$$

Цикл карно

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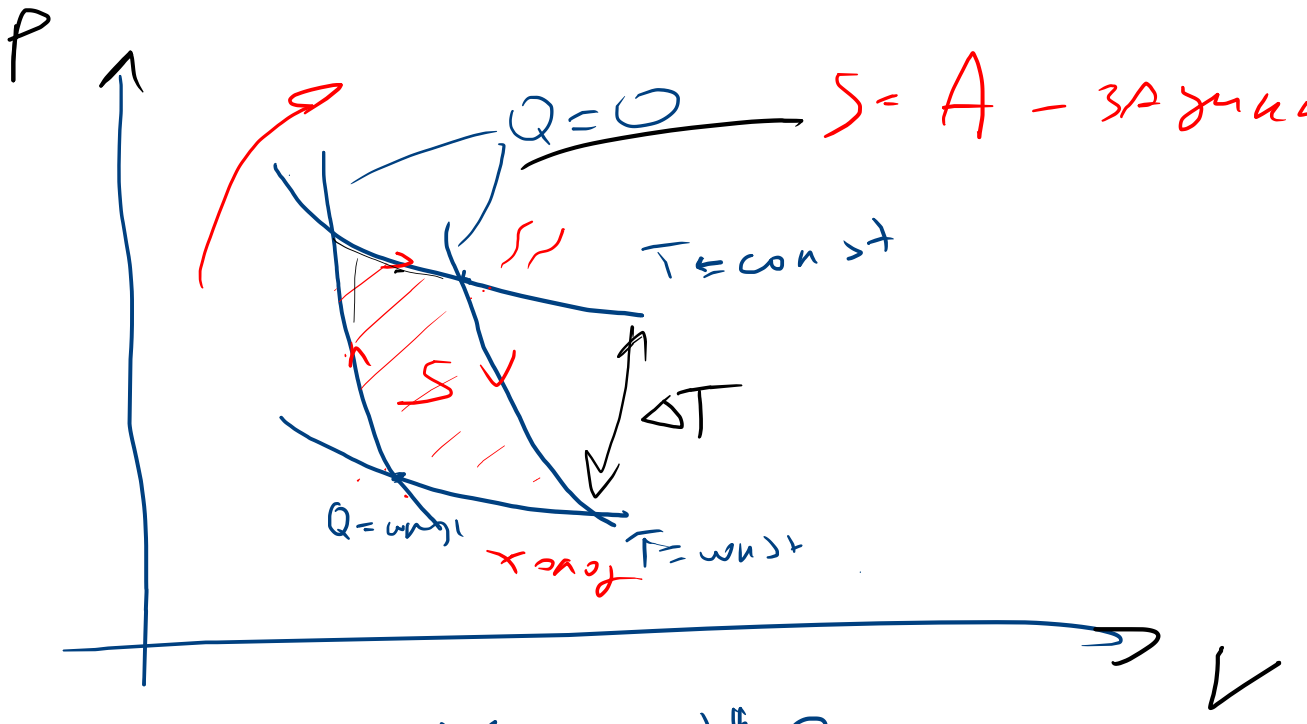
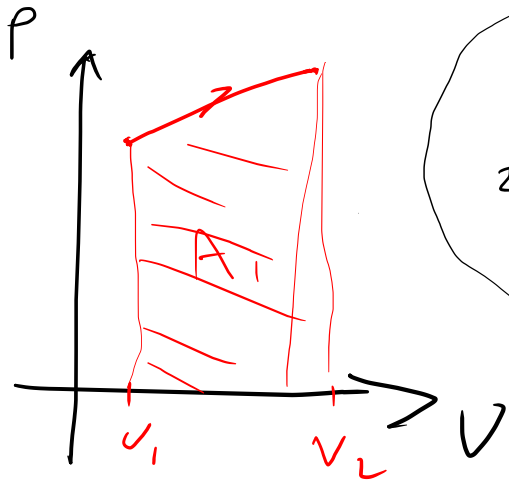


Цикл КАРНО

$$\eta = 1 - \frac{T_2}{T_1}$$

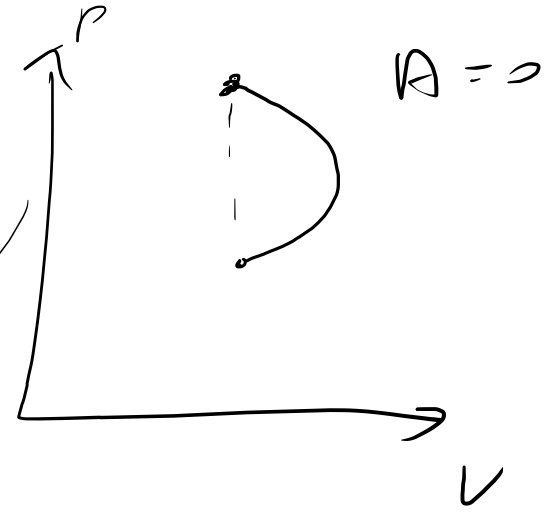


$A > 0$

2 A_3

РАБОТАЕТ

полезная



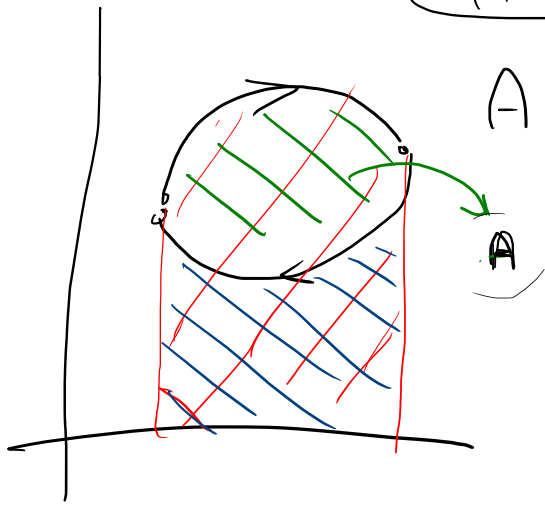
$A = 0$

Мы работаем.

$A < 0$

$$A = A_+ + A_- \quad < 0$$

$$A = |A_+| - |A_-| \leftarrow$$



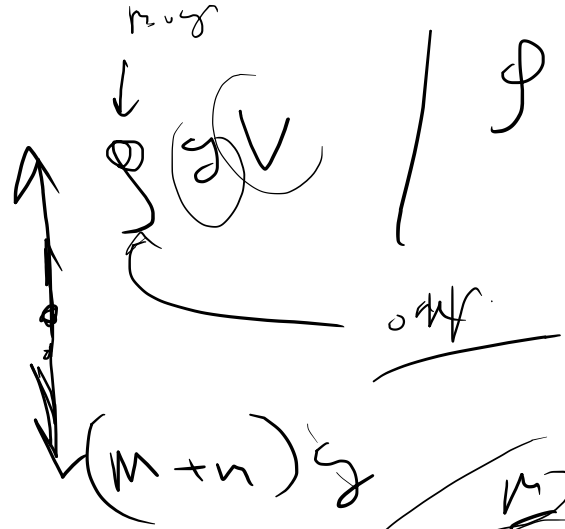
$$\zeta = \frac{A}{A_+} = \frac{A_h}{Q_+}$$

$$\Delta U = 0 \qquad Q_h = A_h$$

$Q = 0$

$\cancel{Q} = \Delta U + A \rightarrow A = \Delta U$

$A = \frac{i}{2} \nu R \Delta T$



$\rho g V \rightarrow (M+n) g$

$\frac{m}{\mu} = 29\,g/mol$

$PV = \nu RT$