$$\mathcal{Z}(\tau,\mu,p,Y) \equiv \sum_X \sum_V \sum_N \sum_\varepsilon e^{\frac{1}{\tau}(-\varepsilon+\mu N - pV + YX)}$$

$$\lambda \equiv e^{\frac{\mu}{\tau}}$$

$$\equiv \sum_X \sum_V \left(\sum_N \lambda^N e^{-\frac{\varepsilon}{\tau}} \right) e^{\frac{1}{\tau}(-pV+YX)}$$

$$\equiv \sum_X \sum_V e^{\frac{1}{\tau}(-pV+YX)} \sum_N \lambda^N \underbrace{\left[\sum_\varepsilon e^{-\frac{\varepsilon}{\tau}} \right]}_{\equiv\, Z_N(V,X)}$$

$$\lambda_p \equiv e^{-\frac{p}{\tau}} \quad , \quad \lambda_Y \equiv e^{\frac{Y}{\tau}}$$

$$\sum_X \lambda_Y^X \sum_V \left[\lambda_p^V \cdot \left[\sum_N \lambda^N Z_N(V,X,p) \right] \right]$$

[illegible] [illegible], [illegible] ekvaation [illegible] [illegible]

$$\boxed{dS = \frac{1}{T}\,dU + \frac{P}{T}\,dV - \frac{\mu}{T}\,dN - \frac{Y}{T}\,dX}$$

[illegible] entropiaan

$$S = \frac{1}{T}(U + pV - \mu N - YX)$$ Eulerin ekvaatio

$$\rightarrow \quad e^{-\frac{1}{T}(U+pV-\mu N-YX)}$$

$$e^{\frac{1}{T}(U - pV + \mu N + YX)}$$

$$S = k_B \ln \Omega \Rightarrow e^{S/k_B} = \Omega$$

$$P = \frac{1}{\Omega} \longrightarrow P = e^{-S/k_B}$$