Zenbait kantitate estatistikoren esangura fisikoa

$$q \equiv \ln \left\{ \sum_{r,s} \exp\left(-\alpha N_r - \beta E_s\right) \right\}$$

$q = q(\alpha, \beta, E_s)$ Kalkula dezagun haren diferentziala:

$$dq = -\overline{N} d\alpha - \overline{E} d\beta - \frac{\beta}{\mathcal{N}} \sum_{r,s} \langle n_{r,s} \rangle dE_s$$

$$d(q + \alpha\overline{N} + \beta\overline{E}) = \beta \left(\frac{\alpha}{\beta} d\overline{N} + d\overline{E} - \frac{1}{\mathcal{N}} \sum_{r,s} \langle n_{r,s} \rangle dE_s \right)$$

Lehenengo Printzipioaren adierazpen diferentzialarekin alderatuz...

$$\delta Q = d\overline{E} + \delta W - \mu d\overline{N}$$

Hauexek dira egin daitezkeen "identifikazioak"...

$$\delta W = -\frac{1}{\mathcal{N}} \sum_{r,s} \langle n_{r,s} \rangle dE_s, \qquad \mu = -\frac{\alpha}{\beta}$$

$$d(q + \alpha\overline{N} + \beta\overline{E}) = \beta \delta Q$$

$$\beta = \frac{1}{k_B T}$$

$$\alpha = -\frac{\mu}{k_B T}$$