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Course 565 / 665 Lecturer Prof. Cavagnero
Day 3. 30. 04 Date 9:55 am
Notes Taken By J. Hong Total Number of Pages

Recall (ex) 8-2

Last day's (ex). If at $T_0$, $P_c = P_0$

then. $\frac{e^{-\beta \cdot 0}}{Q} = 4 \frac{e^{-\beta \varepsilon_0}}{Q} \Rightarrow T^\circ = \frac{\varepsilon_0}{k \ln 4}$

For a system of many molecules "N".

N independent, distinguishable particles.

$Q = q^N$ Q: for N particles
q: for 1 particle.

N independent, indistinguishable particles

$Q = \frac{q^N}{N!}$

Predicting thermodynamic functions.

$Q \longrightarrow U$

N. T. V constant.

$U = \langle E \rangle = \sum_{j=1}^{t} P_j E_j = \sum \frac{e^{-\beta E_j}}{Q} \cdot E_j$

Note that: $\left(\frac{\partial Q}{\partial \beta}\right)_{N,V} = \frac{\partial}{\partial \beta}\left(\sum e^{-\beta E_j}\right) = \sum (-E_j) e^{-\beta E_j}$

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$$\Rightarrow u = -\frac{1}{Q}\left(\frac{\partial Q}{\partial \beta}\right) = -\left(\frac{\partial \ln Q}{\partial \beta}\right)_{N.V.}$$

$$= -\left(\frac{\partial \ln Q}{\partial T}\right)\left(\frac{\partial T}{\partial \beta}\right) = -\left(\frac{\partial \ln Q}{\partial T}\right) \Big/ \left(\frac{\partial \beta}{\partial T}\right) = kT^2 \left(\frac{\partial \ln Q}{\partial T}\right)_{N.V}$$

$$S = k \ln Q + \frac{u}{T}$$

$$F = -kT \ln Q$$

$$\mu = -kT\left(\frac{\partial \ln Q}{\partial N}\right)_{T.V}$$

schottky model for 2-state system

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