Chapter 5

1.) Centrifugal potential : $\phi_c = -\frac{1}{2} M r^2 \omega^2$

in analogy to gravitation:

$$\mu = \mu_{\text{ideal gas}} + \mu_{\text{external}}$$

$$\mu_{\text{total}} = \tau \log\left(n/n_Q\right) - \frac{1}{2} M r^2 \omega^2$$

In equilibrium, μ_{total} must be independent of r

$\Rightarrow$

$$\tau \log\left(\frac{n(r)}{n(Q)}\right) - \frac{1}{2} M r^2 \omega^2 = \tau \log\left(\frac{n(r=0)}{n_Q}\right)$$

$$\rightsquigarrow \quad \underline{\underline{\frac{n(r)}{\cancel{n_Q}} = \frac{n(r=0)}{\cancel{n_Q}} \exp\left(+\frac{1}{2}\frac{M r^2 \omega^2}{\tau}\right)}}$$

4) $n_{in} \simeq 10^4 n_{out}$

$$\Delta\mu = \tau \log\left(\frac{n_{in}}{n_Q}\right) - \tau \log\left(\frac{n_{out}}{n_Q}\right) = \tau \underbrace{\log\left(\frac{n_{in}}{n_{out}}\right)}_{\simeq 9.2}$$

$\Delta\mu = 9.2\,\tau$; I know that $300\,K \hat{=} \frac{1}{40}$ eV in energy.

$\Rightarrow \Delta\mu = 9.2 \frac{1}{40}$ eV. $\simeq$ <u>0.23 eV</u> $\Rightarrow$ <u>voltage = 0.23 V</u>