Extra (Relevant) problems

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In the following we work with a gas having partition function given as:

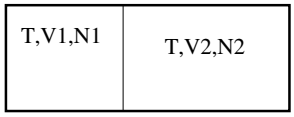
$$Z = \frac{1}{N!}\left(V/V_Q\right)^N \tag{1}$$

$$V_Q = \left(\frac{h}{\sqrt{2\pi m k_B T}}\right)^3 \tag{2}$$

you might recognize this as being an ideal gas.

Equilibrium volume

The gas is placed in a container with a frictionless movable heat conducting wall. The number of particles in each subunit (N1 and N2) is not necessary equal, but constant. The container is in good thermal contact with the surroundings.

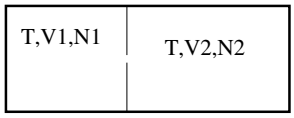


Calculate $V1$ and $V2$ (the volumes) in equilibrium (without using the ideal gas law).

Compare to what you get from the ideal gas law.

Equilibrium particle number

The gas is placed in a container with a stationary heat conducting wall, which has can be penetrated by the particles. The volume of each subunit (V1 and V2) is not necessary equal.



Calculate $N1$ and $N2$ (the particle numbers) in equilibrium (without using the ideal gas law).

Compare to what you get from the ideal gas law.