Information for Second Hour Exam

The exam will be closed book and closed notes, but you will be allowed one sheet of 8.5 × 11” paper (both sides) with your own notes, equations, and inspirational quotations. Note that you must incorporate a subset of your notes for Exam I onto this single sheet.

You must bring a “simple” calculator. There will be a lot of numerical calculations.

Material covered:

- Lectures 11-21
- Problem Sets #4-#6

\[ q_{\text{trans}}, \ q_{\text{rot}}, \ q_{\text{vib}}, \ q_{\text{electronic}} \]

- Partition functions for internal degrees of freedom (including nuclear) of atoms, diatomic, and polyatomic molecules.

- nuclear spin, ortho/para
- symmetry number
- ortho/para
- Difference between \( q_{\text{vib}} \) and \( q_{\text{vib}}^* \)
- Computation of Thermodynamic quantities for gases from spectroscopic data.

- Classical Mechanical formulation of \( Q(N,V,T) \)

- Equipartition
- High-T and Low-T limits for all thermodynamic quantities, especially \( C_v \) and \( U \).

- Model inter-particle potentials

- Intermolecular interactions
- cluster expansion

- van der Waals and Virial equation

- Chemical equilibrium: \( \mu_A^o, \mu_B^o, \) etc. \( \rightarrow K_p \)

\[ K_p(T) \leftrightarrow \text{partition functions, group factors by type} \]
\[ \Delta D_0^0 \]

- Dulong and Petit and Einstein models for the heat capacity of a solid.