

CHEM 550 Problem Set #7

Due Monday Nov. 17 at 5pm in Prof. Ginger's mailbox.

Levine exercises: 6th Ed (5th Ed)

8.23 (8.20) – remember what the computer can do wrong

8.40 (8.34) – matrices

8.32 (8.27) – more PIB variation functions

9.3 (9.1) – perturbation for of an anharmonic oscillator

9.4 (9.2) – perturbation for a particle in box

9.11 (9.8) – variational theory for hydride ion

9.30 (9.26) – concept review

Additional Problems

1) Complete the missing steps from lecture in the calculation of the radiative lifetime of the $2p_0$ state of a hydrogen atom.

2a) Calculate the transition dipole moment for $2p_0$ to $1s$.

2b) Calculate the Einstein A coefficient for this transition and the lifetime of the state.

2c) Check your answer in 2b) against the experimental values from the NIST reference tables online at http://physics.nist.gov/PhysRefData/ASD/lines_form.html This is nice—you've come far enough to actually calculate REAL values for things!

Freshman Chemistry Revisited

2) When UV radiation of wavelength 58.4 nm from a He lamp is directed on to a sample of Krypton gas, electrons are ejected with a maximum speed of 1.59×10^6 m/s. What is the ionization energy of Krypton?