

This worksheet is **due at the time of your lecture final exam**. To complete the assignment, show in *detailed steps* how to get the answer that is given for each of the problems. *Failure to use this form for work and answers will result in a point penalty.*

Problem 1: If the de Broglie wavelength of an electron is 555 nm, what is its velocity? The mass of an electron is 9.1×10^{-31} kg.

Answer to Problem #1: 1.3×10^3 m/s

Problem 2: What is the energy of a photon of blue light that has a wavelength of 450 nm? What is the energy per mole?

Answer to Problem #2: 4.4×10^{-19} J; 260 kJ (270 kJ ok if more than 2 sig J value used)

Problem 3: What is the electron configuration for Cr^{2+} ? Cr^{3+} ? Which is more paramagnetic? How many unpaired electrons does each paramagnetic ion have? (Use **orbital box notation** and **give the electron configuration for both ions** to receive credit!)

Answer to Problem #3: The more paramagnetic species, Cr^{2+} , has four unpaired electrons.

Problem 4: Photography lenses incorporate small amounts of silver(I) chloride in the glass of the lens. The following reaction occurs in the light, causing the lens to darken: $\text{AgCl(s)} \rightarrow \text{Ag(s)} + \text{Cl}$

The enthalpy change for this reaction is 3.10×10^2 kJ/mol. Assuming all this energy is supplied by light, what is the maximum wavelength of light that can cause this reaction?

Answer to Problem #4: 3.86×10^{-7} m

Problem 5: Using a strict interpretation of the $n + l$ rule, how many protons would an atom need to create a ground state electron configuration with one electron in a 5g orbital? (Give the **electron configuration starting with [Rn]** for the atom to receive credit)

Answer to Problem #5: 121 protons