CH 221 Final Exam Prep Worksheet Name: _____

Worksheet due dates: **At the time of your Lecture Final** *(01, H1)* **, Wed, 12/11, 11:59 PM** *(W1, email)*. To complete, show ***detailed*** *steps* on how to get the given answer for each problem. *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: **AgCl(s) → Ag(s) + 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 *in proper electron filling order* to receive credit)

Answer to Problem #5: **121 protons**