Competencies for CHEM 1110 - test 3: **31 items**

item	**Performance/Task:** The student will:	Tro - text sections
Nature of Electromagnetic Waves		
1	Be capable of describing the wave nature of light and make calculations base on frequency and wave length	7.2
2	Be capable of describing diffraction and interference effects	7.2
3	Be capable of describing some effects of the particle nature of light and the relationship to the photon energy	7.2
Theory of Atomic Structure		
4	Be able to describe the dual nature of matter, giving some examples of this dual nature	7.4
5	Know the implications of and be able to perform calculations base upon the deBroglie relationship and the Heisenberg uncertainty principle.	7.4
6	Know what is meant by "Quantum" and be able to describe the fundamental differences between classical and quantum physics	7.5
7	Be able to describe how emission and adsorption spectra arise and do calculations for simple spectra (change in n for H atom)	7.5
8	Be able describe and to give reasons for quantum numbers	7.5
9	Know what is meant by energy levels and the meaning of the four quantum numbers for an electron in an atom	7.6
10	Know the selection rules for the quantum numbers of electrons in an atom.	7.6
11	Know how to designate the quantum numbers by the letter designation, i. e. the electron configurations.	8.3
12	Be able to use the aufbau principle based on the hydrogen atom to give the electron configuration for any atom in its ground state..	8.3
13	Know the order of the high stability configurations and Hund's rule.	8.3
14	Be able to correlate the electron configuration with the position of elements on the periodic table	8.4, 8.5
Periodic Trends		
15	Know the periodic trends, the exceptions to the trends, and the logic behind both for inozation energy, electron affinity, atomic and ionic radius.	8.6, 8.7
16	Be able to describe the peroxides and superoxides in terms of oxidation number and ions formed	table 3.5

Bond Structure		
17	Know the definition of valence electrons and how to tell how many there are for a particular atom.	9.3
18	Know the definition of ionic compound formation and be able to describe what an ionic compound is.	9.4
19	Be able to write combination reactions of non-metals (including H) with metals to give principal oxidation number.	
20	Be able to use the Lewis dot structures of ionic and covalent molecules and ions using valence electrons.	9.4, 9.5
21	Be able to apply the rules for Lewis dot formulas. (These are given in the lab manual.)	9.4, 9.5
22	Know the definition of covalent compounds and how each is formed.	9.4, 9.5
23	Be able to explain the reason for the formation of ionic or covalent compounds based on the tendency to obtain highly stable electron configuations	9.4, 9.5
24	Know the definition of lone or unshare electron pair and how to show this in the Lewis dot structure	9.5
25	Know the definition of electronegativity and its periodic trend.	9.6
26	Be able to predict whether a compound is ionic or covalent based upon electronegativity and periodic table position.	9.6
27	Be able to describe the bonding involved in a covalent compound including the possibility of double and triple bonding.	9.7
28	Be able to distinguish between hydrogen compounds with H having an oxidation number -1 and those with +1.	
29	Be able to recognize the presence of resonance and symbolize it.	9.8
30	Be able to determine ΔH from Bond Energies.	9.8
31	Be able make calculations bases on bond lengths.	9.8