Honors Chemistry hcsem2prep10.doc
Preparing for the Semester 2 Final Exam

Concepts:

1. Definition and calculation of the molarity of a solution.
2. Hydronium/hydroxide concentrations in solution calculations.
3. Redox half reaction equation balancing.
4. Reactant/product mass-mole calculations.
5. Electron box diagram.
6. Spectroscopic/condensed spectroscopic electron configuration.
7. Periodic table trends within groups and periods including electronegativity.
8. Speed, frequency, wavelength relationships and calculations.
9. Activity series of metals and redox reactions.
10. Galvanic/voltaic cell construction and usage.
11. Electrolytic cell construction and usage.
12. Oxidation state determination.
13. Rydberg equation.
14. Molecular and electronic geometry; bond polarity and bond angles
15. Acid/base equilibrium constants, K_a/K_b.
16. Bond order and resonance.
17. Strong vs. weak acids and bases.
18. Concentrated vs. dilute solutions.
19. Conjugate acid/base pairs.
20. Bronsted/Arrhenius definition of acids and bases.
21. Amphoteric/amphiprotic compounds.
22. pH and pOH
23. Acid/base neutralization/titration reactions.
24. Combustion reactions.
25. Metal/nonmetal behavior.
26. Names of polyatomic ions and their charges.
27. Naming acids and bases.
28. Valence shell electrons.
29. Bohr model of the atom.
30. Quantum mechanical model of the atom.
31. Quantum numbers, shapes of orbitals and the number of electrons they can contain.
32. VSEPR theory/Valence bond theory.
33. Electromagnetic spectrum regions.
34. Atomic energy absorption and photon emission.
35. Electrolytic calculations involving current and voltage.
36. Hund's rule, Aufbau principle, Pauli Exclusion Principle, Heisenberg Uncertainty Principle.
37. DeBroglie wavelength.
38. Hybridization, bond angles, σ vs. π bonds.
39. Mass, mole, molecule, atom conversions.
40. Cell potential based on standard reduction potentials.
41. Reducing vs. oxidizing agent.
42. Structural isomers
43. Organic chemistry nomenclature.
44. Identify functional groups on molecules (enes, ynes, alcohol, ether, aldehyde, ketone, amine, carboxylic acid, ester, amide and benzene derivatives)
45. Know basic organic reactions (esterification, addition, oxidation with alcohols)
46. Know how polymers form from monomers
47. Know what animals/humans derive energy from (proteins, fats, carbohydrates)
48. Know how proteins form.
49. Know the types of bonds responsible for secondary through quaternary structure of proteins.
50. Know what amino acids are.
51. Know the basic composition of nucleotide.
52. Know the structural difference between RNA and DNA.
53. Know the basic process for protein synthesis.

$[H_3O^+] = 10^{-pH}$	$[OH^-] = 10^{-pOH}$
$pH + pOH = 14$	$K_w = 1.0\times10^{-14}$
$c = \lambda\nu$	$c=3.0\times10^{8}$ m/s
$1nm=1\times10^{-9}m$	$K = {}^oC + 273.15$
$h=6.626\times10^{-34}Js$	$E=h\nu=hc/\lambda$
$E^o_{cell} = E^o_{red} + E^o_{ox}$	$\Delta E = -R_H\,(1/n_{hi}^2 - 1/n_{lo}^2)$
$R_H = 2.18\times10^{-18}J$	n=mass/molar mass
$[H_3O^+][OH^-] = 1.0\times10^{-14}$	
$K_aK_b = K_w$	$K_a = [H^+][A^-]/[HA]$
$E^o_{cell} = E^o_{cat} - E^o_{anode}$	$N_A = 6.022\times10^{23}$
M = mol/L	$F = 96{,}480C/mol\ e^-$
Current = C/s = amps	Voltage = J/C