Supplemental Instruction
CHEM 115a
Professor Reisler

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Exam 1 Review (9/17)

Get excited! Your first ever college chemistry exam is coming up in 3 days!!!! A friend of mine once said: success is where preparation meets opportunity. As corny as it sounds, these exams are *your* opportunity to show off the hard work you've put into this class so far. So let's get workin'!

1. **Sig Figs:** can't live with 'em, can't live without 'em.
   a. How many sig figs do the following numbers have:
      i. 100.53
      ii. 10.00
      iii. 0.004
      iv. 101.0
   b. (1.532 – 0.9993 + 3.48) / 5 = (5 is exact)
   c. $\frac{2.626}{4.3} + \frac{3.500}{1.990} + \frac{0.50}{2.226} =$
   d. $[\ 5.340 \times 10^{-3} + 2.0045 \times 10^{-1} - 3.3 \times 10^{-2}\ ] \times 0.8885 =$
   e. (71.4 / 2.5) + (0.055 * 1.10) =

2. **Unit Conversions**: Just line up the units and cancel them out!
   a. Convert 300. millimols to megamols.
   b. Convert 1 amu into kilograms/atom.
   c. Convert amus into g/mol.

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3. **Isotopes and Ions**: because every atom is special…
   a. Isotopes differ in the number of _____
   b. Ions differ in the number of _____
      i. _____ are negatively charged ions
      ii. _____ are positive charged ions
   c. Fill in the following table:

Element Name	Symbol	Protons	Neutrons	Electrons	Net Charge
	^{53}V				+5
Strontium			47		+2
	^{28}Si			18	
Astatine			125		-1

4. **Periodic Trends:**

a. Atomic Radii increases _____ and _____ on the periodic table

b. Ionization energy increases _____ and _____ on the periodic table

c. Electron affinity increases _____ and _____ on the periodic table

c. Cations have a _____ radius than the neutral atom

d. Anions have a _____ radius than the neutral atom

e. Order the following in order of increasing ionization energy: Ar, Br, H, C,

f. Order the following in order of increasing electron affinity: In, Ca, He, Cl

g. Order the following in order of decreasing electronegativity:

S, N, Cl, H, O, I, C, F, Br,

____ > ____ > ____ > ____ > ____ > ____ > ____ > ____ > ____

5. **Balancing Equations:**
   a. ___ $C_2H_4O_2$ + ____ O_2 ➔ ___ CO_2 + ___ H_2O
   b. ___ $ZnSO_4$ + ____ Li_2CO_3 ➔ ___ $ZnCO_3$ + _____ Li_2SO_4
   c. ____ V_2O_5 + ___ CaS ➔ ___ CaO + ___ V_2S_5

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d. ____ H_2SO_4 + ___ $B(OH)_3$ ➔ $B_2(SO_4)_3$ + ___ H_2O

6. **Law of Definite Proportions**: A 16.3 g sample of a compound containing Fe and O has 11.4 g of Fe. How much O does a 9.3 g sample have?

7. **Law of Multiple Proportions**: A dark brown, binary compound is made up of only oxygen and a metal. It is 13.38% oxygen by mass. When silly Sally heats up this metal, some gas escaped, leaving a new red compound with 9.334% oxygen by mass. Silly Sally rushes off to tell her lab partner, leaving the compound on the Bunsen burner. When she returns, the compound has turned reddish yellow, and is 7.168% oxygen by mass.

a. How much oxygen combines with 1.000 g of metal in each of these compounds?

b. If the empirical formula of the first compound is MO_2 (M means metal), what are the empirical formulas of the other 2 compounds?

c. What is the metal?