Midterm Review Practice Problems:

Chapter 1:

Matching:

D	1.	Chemistry	a.	Mass/volume
G	2.	Significant digits	b.	Measures mass
H	3.	Precision	c.	Smaller than L
B	4.	Grams	d.	Study of matter and changes it undergoes
C	5.	mL	e.	Makes a unit larger
A	6.	Density	f.	Closeness to the actual value
F	7.	Accuracy	g.	Certain digits plus one uncertain digit
E	8.	Kilo	h.	Repeatability of a measurement

Problems:

9. How many sig digs do each of the following have?
   - a. 0.0123 m 3 (pacific)
   - b. 4.00 kg 3 (pacific)
   - c. 0.0120 m 3 (pacific)
   - d. 2300 L 2 (Atlantic)

10. How many sig digs should the following answers have?
   - a. 5.69 x 3.0 2 sig digs
   - b. 6.70/1.2 2 sig digs
   - c. 2500 x 2.34 2 sig digs

11. Give answers to each of the following to the correct number of sig digs or place value
   - a. 1.23 m x 4.5 m = 5.535 ≈ 5.5 m^2
   - b. 1.2 g + 3.45 g + 6.789 g = 11.439 ≈ 11.4 g

12. The density of a liquid is 0.88 g/mL. You have a 2.34 mL sample of this liquid. How much does the liquid sample weigh in grams?

$D = \frac{M}{V}$ ... $M = DV = (0.88)(2.34)$

$= 2.0592 \approx 2 g$

13. Convert the following to Kelvin
   - a. 76 ℃
   - b. - 47℃
   - c. 213℃

76+273 = 349 K -47+273=226K 213+273 = 486K

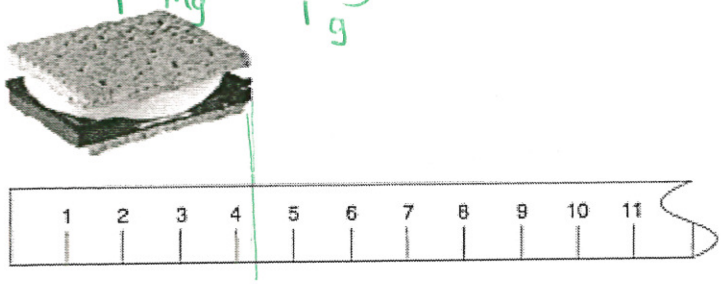
14. Convert 2.34 × 10^6 cm to km.

$\frac{2.34\times10^6 \text{ cm}}{1} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 23.4 \text{ km}$

15. Convert 6.78 ´ 10^{-3} Mg to mg.

$6.78\times10^{-3} \text{ Mg} \times \frac{1\times10^6 \text{ g}}{1 \text{ Mg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 6780000 \text{ mg}$

16.



estimate ↓

How long is the smore? Be sure to give your answer to include an estimated digit. 4.2 cm

Chapter 2:

1. What are the four common indicators of a chemical reaction?
2. Label the following as a chemical change or a physical change:
   a. melting from solid water to liquid water P
   b. dissolving sodium chloride in water P
   c. browning the bread in a grill cheese sandwich C
   d. melting the cheese in a grill cheese sandwich P
3. What is the conservation of matter? matter cannot be created or destroyed
4. Label the following as a compound or a mixture:
   a. salt water mixture (homogeneous)
   b. chocolate chip cookie mixture (heterogeneous)
   c. Italian salad dressing mixtur (heterogeneous)

Chapter 3 and 24:

+ 11 n° 12 e⁻ 11

1. How many protons, neutrons and electrons does $^{23}_{11}Na^{+}$ have?
2. When you compare two isotopes of an element, the number of which subatomic particles remains the same? the number of which subatomic particle is different? protons same; neutrons change
3. How many neutrons does $^{23}_{11}Na$ have? 12 neutrons
4. What is the atomic number of neon? 10
5. How many protons does lead have? 82 protons
6. Sodium has lost one electron. What is the charge of this sodium particle? Na^{+1}
7. How many neutrons does U-238? 238 − 92 (protons in U) = 146 neutrons
8. What is the mass number and atomic number of an alpha particle? beta particle?

Alpha $^{4}_{2}\alpha$ Beta $^{0}_{-1}\beta$

9. For each of the following, identify the number of protons, electrons and neutrons.

	protons	electrons	neutrons
a. $^{222}_{86}Rn$	86	86	222 - 86 = 136
b. $^{32}_{16}S$	16	16	32 - 16 = 16
c. $^{80}_{34}Se^{-2}$	34	36	80 - 34 = 46
d. $^{60}_{27}Co^{+3}$	27	24	60 - 27 = 33

10. Using the information given in 9b (above) for sulfur and the Periodic Table, answer the following questions: $^{32}_{16}S$

a. What is the atomic number? 16

b. What is the mass number? 32

c. What is the average atomic mass? (from P.T. 32.066 amu)

d. If another atom of sulfur had a mass number of 33, it would be called an isotope and would contain 16 protons, 16 electrons and 17 neutrons.

11. Review Rutherford's gold foil experiment and his conclusions based on the evidence he collected. 1 nucleus with + particles ; empty space ; electrons outside

12. Cations are + (pawsitive or negative) and result when atoms lose (lose or gain) electrons.

13. How much iodine-126 is present in a 46 g sample after 39 days? The half-life of iodine-126 is 13 days. ~ 5.8 g

½ lives	mass	time
0	46	0
1	23	13
2	11.5	26
3	5.8 g	39

14. Define fusion. combining atoms

15. Define fission splitting atoms

16. Complete the following nuclear equations:

$^{40}_{19}K \rightarrow$ ~~β~~ $+ \; ^{40}_{18}Ar$ WRONG EQ ... sorry ☺

$^{90}_{38}Sr \rightarrow \; ^{90}_{39}Y \; + \; ^{0}_{-1}\beta$

$^{243}_{95}Am \rightarrow \; ^{239}_{93}Np + \; ^{4}_{2}He$

Chapter 4:

1. What is the maximum number of electrons that could be found in each of the following orbitals:
   a. the 2p orbital 6 e⁻ (p holds 6 e⁻)
   b. the 6f orbital 14e⁻ (f holds 14e⁻)
   c. the 1s orbital 2e⁻ (s holds 2e⁻)
   d. the 5d orbital 10e⁻ (d holds 10e⁻)
   e. the entire 3rd principle energy level (so 3s, 3p, and 3d) 2 + 6 + 10 = 18 e⁻
2. Explain why heated metals only produce certain wavelengths of light? electrons gain specific amounts of energy
3. Write the electron configuration for the following elements:
   a. Strontium $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2$ or $[Kr] 5s^2$
   b. Neon $1s^2 2s^2 2p^6$ or $[He] 2s^2 2p^6$
   c. Silver $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^9$

   or

   $[Kr] 5s^2 4d^9$

d. Fluorine $1s^2 2s^2 2p^5$ or $[He] 2s^2 2p^5$

e. Potassium $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$ or $[Ar] 4s^1$

4. Identify the element with the electron configuration $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2 3d^8$ Ni (28 electrons)

5. When a calcium ion loses two electrons where will they be lost from? (Give energy level and sublevel) 4s (outermost or valence e^-)

6. Give the electron configuration for the Chloride ion (Cl^{-1})

$1s^2 2s^2 2p^6 3s^2 3p^6$ (gains $1e^-$)

Chapter 5:

1. Which of the following is larger, Na or Na^+?
2. Which of the following has a large atomic radius, S or Cl?
3. Which of the following has the greater ionization energy, S or Cl?
4. Which of the following has the greater negative value for electron affinity, S or Cl?
5. Define group. ↓ on PT
6. Define family. ↓ on PT
7. Define period. → on PT
8. Find the following on the periodic table alkali metals, alkaline earth metals, halogens, noble gases, transition metals, inner transition metals, s block, p block, d block, f block use book or notes
9. Identify the number of valence electrons for each group in the s and p blocks and the most likely ion charges for each. 1 - 1 13 - 3 15 - 5 17 - 7
2 - 2 14 - 4 16 - 6 18 - 8

Chapter 7:

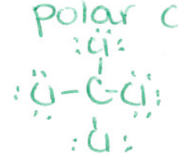
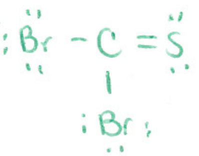
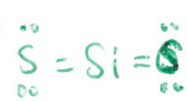
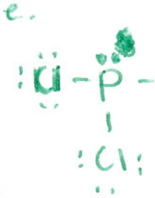
1. Name the following compounds:
   a. NaCl sodium chloride
   b. $CuSO_4$ copper (II) sulfate
   c. Cu_2SO_4 copper (I) sulfate
   d. AlN aluminum nitride
   e. Al_2S_3 aluminum sulfide
2. What is the chemical symbol of the following compound?
   a. Iron (III) chloride $FeCl_3$
   b. Iron (II) chloride $FeCl_2$
   c. aluminum sulfate $Al(SO_4)_3$
   d. diphosphorus pentoxide P_2O_5
   e. nitrogen monoxide NO
3. Define the octet rule. most atoms want to get 8 valence e^-
4. Why don't noble gases generally become ions?
5. Name the following compounds:
   a. Mg_3N_2 magnesium nitride
   b. P_2O_5 diphosphorus pentoxide
   c. $Cu(NO_3)_2$ copper (II) nitrate
   d. NH_4Cl ammonium chloride
   e. CO carbon monoxide
   f. $Fe_2(SO_4)_3$ iron (III) sulfate

g. XeF_6 xenon hexafluoride
h. H_2CO_3 carbonic acid

6. List the seven diatomic molecules. H, O, N, Cl, Br, I, F
7. Which of the diatomic molecules has a triple covalent bond? N_2
8. Write the formula for the following compounds:
   a. Carbon tetrachloride CCl_4
   b. Titanium (IV) oxide TiO_2
   c. Nitrogen dioxide NO_2
   d. Cesium chloride $CsCl$
   e. Calcium hydroxide $Ca(OH)_2$
   f. Sulfuric Acid H_2SO_4
   g. Antimony (III) sulfide Sb_2S_3
   h. Sodium chloride $NaCl$
   i. Ammonium oxide $(NH_4)_2O$

Chapter 8:

1. Consider the bond between oxygen and hydrogen in water. 
   a. What is the electronegativity of hydrogen? 2.1
   b. What is the electronegativity of oxygen? 3.5
   c. What is the electronegativity difference? 1.4
   d. What type of bond will exist between hydrogen and oxygen in water? Be very specific. Polar covalent
   e. Draw the electron dot diagram for water. (above)
   f. what will the shape of a water molecule be? bent (2 and 2)
2. Consider the same a,b,c,d,e,f for CCl_4, CBr_2S, SiS_2, PCl_3

CCl_4	CBr_2S	SiS_2	PCl_3
a. C = 2.5	a. C = 2.5	a. S = 2.5	a. P = 2.1
b. Cl = 3.0	b. Br = 2.8 S = 2.5	b. Si = 1.8	b. Cl = 3.0
c. 0.5	c. C–S = 0 C–Br = 0.3	c. 0.7	c. 0.9
d. polar covalent	d. C–S Nonpolar C–Br non polar	d. polar covalent	d. Polar Color
e. 	e. 	e. 	e. 
f. tetrahedral	f. trig. planar	f. linear	f. trig. pyrimidal