Name _____ Hour ____

Mid-Term Review 2017 - 2018

(RAEB - Honors Chemistry)

Chapter 2:

1. How many significant digits are in the following numbers?

   a. 417.0 _____
   b. 0.0005 _____
   c. 500 000 _____
   d. 0.30034 _____
   e. 3.970×10^5 _____
   f. 200.10 _____

2. Convert into Scientific Notation

   a. 73 000 000 _____
   b. 547.85 _____
   c. 246.0 _____
   d. 0.000006243 _____
   e. 69 040 _____
   f. 0.004030 _____

3. What are the SI base units?

4. Compare accuracy and precision. Give examples of each using a measuring device.

5. What are the 3 temperature scales?

6. What are the boiling and freezing points of water in all 3 temperature scales?

7. What equation is used to determine the density of an object?

8. Using the density formula, how do you solve for mass, density, and volume? *(Density triangle)*

9. What is the density of water?

10. What is the difference between the accepted and experimental value?

11. What is a conversion factor? Explain how you would use conversion factors?

12. What is dimensional analysis?

13. What is the order and values of the metric prefixes from largest to smallest?

14. What are the rounding rules for addition and subtraction?

15. What are the rounding rules for multiplication and division?

16. What is a cubic centimeter? How would you write this?

Chapter 3:

1. Which of the following have a definite shape? Solids, liquids, or gases

2. Which of the following have a definite volume? Solids, liquids, or gases

3. Which of the following takes the shape of its container? Solids, liquids, or gases

4. Which of the following is compressible? Solids, liquids, or gases

5. What is the difference between a mixture and a compound?

6. Compare homogeneous and heterogeneous mixtures? Give examples of each.

7. Compare chemical and physical changes

8. Compare filtration and distillation. Are these used to separate compounds or mixtures?

9. How is a compound different from an element?

10. How can you distinguish a substance from a mixture?

11. In a chemical reaction, how does the mass of the reactants compare with the mass of the products?

12. What is the difference between chemical and physical properties? Give examples.

13. What is the main difference between physical and chemical changes?

14. Classify each of the following as physical or chemical changes:

a. Water boiling

b. Milk turns sour

c. Salt dissolves in water

d. A metal rusts

e. Wood burns

f. ice melts

15. What are the differences between extensive and intensive properties?

16. What is the phase change when a substance evaporates or condenses?

17. What is the phase change when a substance undergoes sublimation or Deposition?

18. What is the phase change when something melts or solidifies?

19. Is a solution considered homogeneous or heterogeneous? How many phases does a solution have?

20. Explain the process of distillation and describe the goal of distillation.

21. How can you distinguish between elements and compounds?

22. Explain the compositions of the following substances by looking at their chemical formulas:
    a. H_2O
    b. NH_3
    c. $C_6H_{12}O_6$
    d. CH_4

Chapter 4:

1. What is Dalton's theory?

2. Compare atomic number and mass number

3. List the type of waves in the electromagnetic spectrum by increasing frequency.

4. List the type of waves in the electromagnetic spectrum by increasing wavelenghth.

5. What is the relationship between wavelength and frequency?

6. What is the formula for calculating wave speed? Wavelength? Frequency?

7. Compare the speed of all electromagnetic waves?

8. Where are the 3 subatomic particles located within an atom?

9. What are the masses of the 3 subatomic particles?

10. What is the charge of the nucleus?

11. How do you calculate the number of neutrons and protons given the mass number?

12. What is the difference between an isotope and an ion?

13. Explain how shorthand notation is written. Can you determine protons, neutrons, and mass from this?

14. What distinguishes the atoms of one element from the atoms of another? Give an example.

15. What equation tells you how to calculate the number of neutrons in an atom?

16. What makes an atom electrically neutral?

17. What does the atomic number of each atom represent?

18. How are the elements on the modern periodic table arranged?

19. What are the parts of an atom? What are their charges? Where are they located?

20. Which subatomic particle is mainly responsible for the properties of each element?

21. Which subatomic particle makes each atom unique? Explain.

22. Write the following three isotopes in shorthand notation: Carbon-13, Uranium-238, and Bromine-81

23. Compare mass number and average atomic mass

24. Given the following 4 isotopes of lead with their relative abundances, calculate the average atomic mass to 3 decimal places using "a.m.u." as the units.
    a. Lead-204 at 1.4%
    b. Lead-206 at 24.1%
    c. Lead-207 at 22.1%
    d. Lead-208 at 52.4%

Chapter 5:

1. Complete the chart :

Sublevels	Number of Orbitals	Maximum Electrons
s		
p		
D		
f		

2. What are the 3 rules that govern orbital diagrams and electron configurations
    a.
    b.
    c.
3. Show the orbital diagram for the following elements:
    a. Sodium:
    b. Chlorine
    c. Calcium:
    d. Iron:
4. Write the electron configurations for the following elements
    a. Magnesium:
    b. Titanium:
    c. S^{2-}:
    d. Ba^{2+}:
5. Explain what is meant by $4p^3$.
6. Explain the difference between empty, half-filled, and full orbitals?

7. How many full, empty, and half-filled orbitals are in a silicon atom?

8. What is a quantum of energy? Is energy gained or lost as electrons move away from the nucleus?

9. When are electron configurations stable and unstable?

Chapter 6:

1. What is the arrangement of the modern periodic table?

2. What are the 4 blocks on the periodic table?

3. Where are the representative elements located on the periodic table?

4. What two factors contribute to an atom having a large atomic size?

5. What two factors contribute to an atom having a large electronegativity?

6. What two factors contribute to an atom having a large ionization energy?

7. How many electrons are gained or lost by the elements in the following groups?
   a. 1A:
   b. 2A:
   c. 3A:
   d. 5A:
   e. 6A:
   f. 7A:

8. How many valence electrons exist in the elements in the following groups?
   g. 1A:
   h. 2A:
   i. 3A:
   j. 5A:
   k. 6A:
   l. 7A:

9. For each of the following parts of the periodic table, explain where the final electron enters and the block name:
   a. Groups 1A & 2A:

b. Groups 3A – 8A:

c. Transition Metals:

d. Inner Transition Metals:

10. How many valence electrons do all transition metals possess? Explain.

11. What types of ions get larger? Explain your answer.

12. What types of ions get smaller? Explain your answer.

13. What is the difference between 1^{st}, 2^{nd}, & 3^{rd} ionization energies?

14. Give 2 examples of atoms with low 1^{st} ionization energies. Explain why they have low ionization energies.

15. What is the octet rule?

16. When the representative elements form ions, what is the charge of each group?

17. What is the periodic and Group Trend for:
    i. Atomic Size (radii)

    ii. Electronegativity

    iii. Ionization Energy

18. What groups of elements tend to be reactive? Explain.

Chapter 8:

1. Compare a cation and an anion.

2. Why is it important for an atom to attain a noble gas configuration?

3. What are the properties of metals and metallic bonds?

4. What is a monatomic ion?

5. What is true about the charges of transition metal ions?

6. Identify the ions in the following compounds:
   a. $MnBr_4$:
   b. $Fe(NO_2)_2$
   c. Cr_2O_3
   d. CuS
   e. $Al_2(CrO4)_3$
   f. Ag_3PO_3

7. List the properties of ionic compounds: (Physical state, electrical conductor, boiling point, melting point, etc)

8. What does the term pseudo-stable mean? Explain how an atom becomes pseudo-stable.

9. Why are metals usually good conductors of electricity?

10. List the 6 atoms that become pseudo-stable and give their charges.

11. What are the 3 rules for naming acids?

Chapter 9:

1. List the properties of molecular compounds: (Physical state, electrical conductor, boiling point, melting point, etc)

2. What is the difference between a polar covalent and a nonpolar covalent bond?

3. Rank the following covalent bonds (1-4) in order from least to most polar.
   a. H-Cl
   b. H-Br
   c. H-S
   d. H-C

4. Which of the following gases would you expect to find as molecules and which as individual atoms?
   a. Nitrogen b. Oxygen c. Argon

5. How do you determine which polar covalent bond is the most polar?

6. Identify the 5 molecular shapes and their bond angles. Give an example of each.

7. What causes the molecules to have their shape? *Hint: what does VSEPR mean?*

8. What are the diatomic molecules?

9. How many electrons are shared in a single bond? Double bond? Triple Bond?

10. What is the molecular shape of the following molecules?
    a. C_2H_2
    b. CH_4
    c. CO_2
    d. F_2
    e. NH_3
    f. BH_3
    g. H_2O
    h. PCl_3

11. For all 5 molecular shapes, explain the pattern of bonding pairs and unshared pairs.

12. How many sigma bonds are in the following molecules?

13. How many pi bonds are in a double bond and a triple bond?

14. What is a coordinate covalent bond and why are they formed?

15. What are the 10 prefixes used when naming molecular compounds?

16. What is significant about polar molecules as opposed to nonpolar molecules?

17. What are the types of intermolecular attractions? Give examples.

Chapter 10:

1. How does the law of conservation of mass relate to all chemical reactions?

2. What does the coefficient tell you in a balanced chemical equation?

SINGLE REPLACEMENT REACTIONS **(PREDICT AND BALANCE THE FOLLOWING)**

1. ___Br_2 + ___CaI_2 →
2. ___Mg + ___HCl →
3. ___Zn + ___H_2SO_4 →

DOUBLE REPLACEMENT REACTIONS

1. ___$Ca(OH)_2$ + ___H_3PO_4 →
2. ___$Cd_3(PO_4)_2$ + ___$(NH_4)_2S$ →
3. ___$AgC_2H_3O_2$ + ___K_2CrO_4 →

DECOMPOSITION REACTIONS

1. ___LiCl →
2. ___Fe_2O_3 →
3. ___ KI →

COMBINATION REACTIONS

1. ___Na + ___O_2 →
2. ___K_2O + ___H_2O →
3. ___Al_2O_3 + ___H_2O →

COMBUSTION RECTIONS

1. ___C_6H_6 + ___O_2 →
2. ___$C_{12}H_{22}O_{11}$ + ___O_2 →
3. ___$C_{25}H_{52}$ + ___O_2 →

Nomenclature: *Fill in the chart below*

	NAME	FORMULA	Ionic/Acid/Molecular
1.	Carbon tetrachloride		
2.	Magnesium sulfate		
3.	Iron (II) oxide		
4.	Zinc Chloride		
5.	Copper (I) phosphite		
6.	Aluminum Oxide		
7.	Carbonic Acid		
8.	Phosphorus Tribromide		
9.	Ammonium Hydroxide		
10.	Tin (IV) carbonate		
11.		$Pb_3(PO_4)_2$	
12.		$Hg(CN)_2$	
13.		$AgNO_3$	
14.		$NaClO_3$	
15.		SiO_2	
16.		Co_2S_3	
17.		H_3PO_4	
18.		$Mn(CO_3)_2$	
19.		N_2O_4	
20.		Cu_2SO_3	
21.		$ZnBr_2$	

Chapter 11:

1. Write the chemical formula, the type of representative particle, and the molar mass for the following:

Chemical Name	Formula	Representative Particle	Molar Mass *(g)*
Sodium sulfate			
Dinitrogen pentoxide			
Lead (IV) phosphate			
Cobalt (II) nitrate			
Hydrogen gas			
Dicarbon hexahydride			
Iron (III) carbonate			
Manganese IV dichromate			
Tin (II) phosphite			
Lead IV chromate			
Magnesium acetate			
Sulfuric Acid			
Hydrofluoric acid			
Cupric sulfite			
Phosphoric Acid			
Lithium permanganate			
Hydrofluoric acid			

Mid-Term Exam Review

(Honors Chemistry)

Chapter 1	23,27,29,33
Chapter 2	27,75ad,76ac,80f,82a,85def,88,92,104
Chapter 3	36,37,38,47,61,64,71,72,73,79-83
Chapter 4	45,46,50,59,62,64a,65a,78,79,90-93
Chapter 5	49,61,64bc, 77,79ab,80ab,81ab,86,87,93,101-104
Chapter 6	33,38,47ab,59,60,63,64,65a,66ab,67,69,71,83-86
Chapter 7	27,41,61,68,85-90,92-96(a only for all)
Chapter 8	74,75,78,79,85,86,88-92(a only 85-92)
Chapter 9	90,94-99(ab only for all),105ab,107d,126-128
Chapter 10	73a,74a,86-89(a only on all these),98ab,107,108
Chapter 11	176-179(ab only)