Question 1
3 Points
A nucleus has 28 protons and 36 neutrons. Fill in the three blanks to complete the atomic symbol.

$^{64}_{28}Ni$

Question 2
4 Point
What is the charge of the ions formed from the following atoms?

1. Sulfur **-2**
2. Iodine **-1**
3. Br **-1**
3. Al **+3**

Question 3
6 Points
Give the correct chemical formula and charge for the following polyatomic ions.

1. Ammonium **NH_4^+**
2. Chlorite **ClO_2^-**
3. Nitrate **NO_3^-**
4. Sulfite **SO_3^{2-}**
5. Chromate **CrO_4^{2-}**
6. Carbonate **CO_3^{2-}**

Question 4
6 Points

1. Alkali Metal
2. Transition Metal
3. Noble Gas
4. Non Metal
5. Halide
6. Alkali Earth Metal
7. Metalloid

Use the numbering scheme on the left to give the best classifications for the following elements. (i.e. Na, 1)

1. Be **6**
2. Xe **3**
3. Cl **5**
4. O **4**
5. Fe **2**
6. B **7**

Question 5
6 Points
Give the correct chemical name for the following ionic compounds.

1. $FeCO_3$ **Iron(II) carbonate**
2. NH_4NO_2 **Ammonium nitrite**
3. MgF_2 **Magnesium fluoride**

Question 6
6 Points
Give the correct name for the following covalent compounds.

1. NO **Nitrogen monoxide**
2. N_2O_4 **Dinitrogen tetraoxide**
3. PCl_3 **Phosphorus trichloride**

Question 7
4 Points
The balanced chemical equation for the reaction between hydrochloric acid and iron(III) oxide is

$$6 \; HCl(aq) + Fe_2O_3(s) = 3 \; H_2O(l) + 2 \; FeCl_3(aq)$$

We can interpret this to mean that **6** moles of hydrochloric acid and **1** mole of iron(III) oxide react to produce **3** moles of water and **2** moles of iron(III) chloride

Question 8
6 Points

When the following chemical equations are balanced using the smallest possible integer coefficients, the values of these coefficients are:
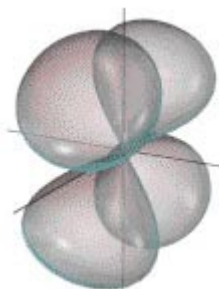
1. 1 $Ca(OH)_2(aq)$ + 2 $HCl(aq)$ = 1 $CaCl_2(aq)$ + 2 $H_2O(l)$
2. 2 $NO(g)$ + 1 $O_2(g)$ = 2 $NO_2(g)$
3. 2 $Fe_2O_3(s)$ + 3 $C(s)$ = 4 $Fe(s)$ + 3 $CO_2(g)$

Question 9
6 Points

A student in a Chem 110 exam was asked to label the atomic orbital depicted. With 2 Points for a correct label and 0 for an incorrect label, grade the students' answers.
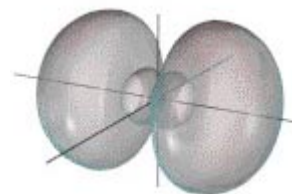
3p

3d

2p

Grade: _0_

Grade: _2_

Grade: _0_

Question 10
8 Points

1. What is the complete electron configuration for the following:

   phosphorus atom: $1s^2 2s^2 2p^6 3s^2 3p^3$

   oxide ion: $1s^2 2s^2 2p^6$

2. What is the valence electron configuration for the following:

   magnesium atom: $3s^2$

   sulfide ion: $3s^2 3p^6$

3. A main group element with a valence electron configuration $3s^2 3p^1$ is in group IIIA.

4. A main group element with a valence electron configuration $2s^2 2p^3$ forms a monatomic ion with a charge of –3.

Question 11
4 Points

From the following list, circle those elements (if any) that are diamagnetic.

Li   Be   B   C   N   O   F   Ne

Question 12
4 Points

Circle which if any of the following have the same number of neutrons as electrons:

$^{24}Mg^{2+}$ $^{59}Co^{2+}$ ^{125}Sn $^{47}Cr^+$ ^{35}Cl

Question 13
3 Points

One of the following ionic compounds is not soluble in water. Circle the compound.

KBr   NaOH   CaCO_3   CaCl_2   NH_4NO_3

Question 14   Eu has two naturally occurring isotopes:

4 Points   **Exact Mass**   **Abundance**
                 $^{151}_{63}$Eu   150.919860 amu   47.80%
                 $^{153}_{63}$Eu   152.921243 amu   52.20%
               What is the average atomic mass of Eu?   [Show Work]

               0.4780(150.919860) + 0.522(152.921243) = 151.964582

                                                     Average Atomic Mass: 151.964582 amu

Question 15   How many grams of nitrogen are present in 1.39 moles of N_2F_4?   [Show Work]
6 Points

1.39 mol N_2F_4	2N
	1 N_2F_4	= 2.78 mol N

2N: 28.02
4F: 76.00
    104.02 g.mol^{-1} | 2.78 mol N | 14.01g N |
                                  |---|---|
                                  | | 1 mol N | =   38.95g N

                                                     Grams of nitrogen: 38.95

Question 16   How many grams of chlorine are present in 4.74 grams of PCl_5?   [Show Work]
8 Points

4.74g PCl_5	1 mol PCl_5
	208.22g PCl_5	= 0.0227 mol PCl_5

   P: 30.97
   5Cl: 177.25 | 0.0227 mol PCl_5 | 5 Cl |
       208.22 g.mol^{-1} |---|---|
                                  | | 1 PCl_5 | =   0.1138 mol Cl

0.1138 mol Cl	35.45g Cl
	1 mol Cl	= 4.034g Cl

                                                     Grams of Chlorine: 4.034

Question 17   A compound is found to contain:
6 Points   39.99% C   6.727% H   53.28% O
               The empirical formula for this compound is?

                          C   H   O
                       39.99%   6.727%   53.28%
                       39.99 g   6.727 g   53.28 g
                       3.329 mol   6.660 mol   3.330 mol
                          1   2   1
                                      CH_2O

                                                     Empirical formula: CH_2O

Question 18   If the molecular weight for the compound in Question X was later found to be 180.2 g/mol. Then
4 Points   the molecular formula for this compound is?

C: 12.01
2H: 2.02
O: 16.00
    30.03 g.mol^{-1}

$$\frac{180.2\ g.mol^{-1}}{30.03\ g.mol^{-1}} = 6$$

$C_6H_{12}O_6$

Molecular formula: $C_6H_{12}O_6$

Question 19   Consider the following elements:
6 Points
               Al   Si   P   S   Cl

1. Which element would you expect to have the largest atomic radius?   Al

2. Which element would you expect to have the greatest metallic character?   Al

3. Which element would you expect to have the smallest ionization energy?   Al