MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) All of the following statements about different elements are true EXCEPT:
   A) Manganese is a transition metal.
   B) Krypton is one of the noble gases.
   C) Barium is an alkali metal.
   D) Iodine is a halogen.

2) Which of the following statements about ions is INCORRECT?
   A) Cations are formed when an atom loses electrons.
   B) Anions are formed when an atom gains electrons.
   C) Cations are formed when an atom gains protons.
   D) Cations are positive ions and anions are negative ions.

3) Isotopes are:
   A) atoms of the same element that have different number of neutrons.
   B) atoms of the same element that have the same number of neutrons.
   C) atoms of the same element that have different number of protons.
   D) atoms of the same element that have different number of electrons.

4) A specific isotope of an element is known to have 15 protons and 16 neutrons. Which symbol would properly represent this isotope?
   A) 31 15
   B) 31 16
   C) 15 31
   D) 16 15

5) The nucleus of an atom consists mainly of
   A) protons, neutrons, and electrons
   B) neutrons and electrons.
   C) protons and electrons.
   D) protons and neutrons.

6) Which statement reflects the results of Rutherford’s gold foil experiments?
   A) Many alpha particles were deflected while passing through the foil.
   B) Most all of the alpha particles were deflected back in the direction from which they came.
   C) Many alpha particles sputtered gold atoms off of the surface of the foil.
   D) Most all of the alpha particles passed directly through the foil.
7) Which among the following elements does not exist as a diatomic molecule in nature?
   A) neon
   B) hydrogen
   C) nitrogen
   D) fluorine

8) Which of the following is a molecular compound?
   A) nitrogen monoxide
   B) calcium acetate
   C) barium sulfide
   D) potassium hydroxide

9) Choose the pair of names and formulas that do not match.
   A) aluminum sulfate: Al₂(SO₄)₃
   B) sodium hydrogen carbonate: NaHCO₃
   C) calcium carbonate: CaCO₃
   D) magnesium nitrite: Mg(NO₂)₃

10) A certain oxyacid is derived from the oxyanion SO₃²⁻. The formula for the oxyacid is
    A) HSO₃
    B) H₃SO₃
    C) H₂SO₄
    D) H₂SO₃

11) What is correct name of the compound whose formula is N₂O₄?
    A) nitrogen dioxide
    B) nitrogen tetroxide
    C) dinitrogen tetroxide
    D) dinitrogen oxide
Short Answer Problems. Show ALL calculations

1. Silver has two naturally occurring isotopes (Ag – 107 and Ag – 109).
   a. Determine the number of protons and neutrons in each isotope of silver.
   b. Use the periodic table to find the atomic mass of silver.
   c. If the natural abundance of Ag – 107 is 51.84%, what is the natural abundance of Ag – 109?
   d. If the mass of Ag – 107 is 106.905 amu, what is the mass of Ag – 109?
2. **Explain** what is wrong with the names given in parentheses for each of the following compounds **and** provide the correct names.
   
   a. $\text{BaCl}_2$ (barium dichloride)
   
   b. $\text{Fe}_3\text{O}_4$ (iron (II) oxide)
   
   c. $\text{Mg(HCO}_3\text{)}_2$ (magnesium (II) bicarbonate)
3. Complete the table below:

<table>
<thead>
<tr>
<th>Formula</th>
<th>Type of compound (Ionic, Molecular, Acid)</th>
<th>Name</th>
<th>Formula Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>N₂H₄</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H₂SO₄(aq)</td>
<td></td>
<td>Potassium chloride</td>
<td></td>
</tr>
</tbody>
</table>

END OF QUESTIONS
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The names of the elements whose symbols are Si, P, Mn, and S are respectively,
   A) silicon, potassium, magnesium, and sodium.
   B) silver, phosphorus, magnesium, and sulfur.
   C) silicon, potassium, magnesium, and sulfur.
   D) silicon, phosphorus, magnesium, and sulfur.
   E) silicon, phosphorus, manganese, and sulfur.

2) All of the following statements about different elements are true EXCEPT:
   A) Sulfur is considered a metalloid.
   B) Manganese is a transition metal.
   C) Krypton is one of the noble gases.
   D) Iodine is a halogen.
   E) Barium is an alkaline earth metal.

3) Which of the following statements about ions is INCORRECT?
   A) Cations are positive ions and anions are negative ions.
   B) Cations are formed when an atom gains protons.
   C) Cations are formed when an atom loses electrons.
   D) Anions are formed when an atom gains electrons.
   E) All statements are correct.

4) How many protons and electrons are present in O2-?
   A) 8 protons and 8 electrons.
   B) 10 protons and 8 electrons.
   C) 16 protons and 8 electrons.
   D) 8 protons and 10 electrons.
   E) none of the above

5) Isotopes are:
   A) atoms of the same element that have different number of protons.
   B) atoms of the same element that have different number of electrons.
   C) atoms of the same element that have the same number of neutrons.
   D) atoms of the same element that have different number of neutrons.
   E) none of the above
6) An atom that has the same number of neutrons as $^{138}_{56}$Ba is

A) $^{138}_{55}$Cs  
B) $^{136}_{54}$Xe  
C) $^{136}_{56}$Ba  
D) $^{137}_{57}$La  
E) none of the above

7) A fictional element has two naturally occurring isotopes with the natural abundances shown here:

<table>
<thead>
<tr>
<th>ISOTOPE</th>
<th>ABUNDANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>40.0%</td>
</tr>
<tr>
<td>20</td>
<td>60.0%</td>
</tr>
</tbody>
</table>

Which statement is true for this element?

A) The atomic mass would be greater than 20.  
B) The atomic mass would be closer to 18 than to 20.  
C) The atomic mass would be closer to 20 than to 18.  
D) The atomic mass would be less than 18.  
E) The atomic mass would be exactly 19.

8) Choose the pair of names and formulas that do not match.

A) sodium hydrogen carbonate: NaHCO$_3$  
B) magnesium nitrite: Mg(NO$_2$)$_3$  
C) potassium hydroxide: KOH  
D) calcium carbonate: CaCO$_3$  
E) aluminum sulfate: Al$_2$(SO$_4$)$_3$

9) What is the formula mass for potassium nitrate?

A) 85.11 amu  
B) 92.99 amu  
C) 117.11 amu  
D) 101.10 amu  
E) none of the above

10) Which of the following has the largest formula mass?

A) SiO$_2$  
B) CO$_2$  
C) H$_2$O  
D) SO$_2$  
E) NO$_2$

11) Ammonium fluoride is considered which of the following?

A) ionic compound  
B) molecular element  
C) atomic element  
D) molecular compound  
E) none of the above