1. Draw Lewis structures for the following molecules, predict their shapes and label them as polar or non-polar:

   a. C₂H₂
   
   b. NH₃
   
   c. CH₂O
   
   d. CBr₄
   
   e. SO₃

2. Balance each equation and determine, in grams, the appropriate amount of each of the reactants needed and each of the products formed.

   a. C₂H₆O + O₂ → CO₂ + H₂O
   
   b. Al + Br₂ → AlBr₃
   
   c. AgNO₃ + CaCl₂ → AgCl↓ + Ca(NO₃)₂
   
   d. C₆H₁₂O₃ → C₆H₆ + H₂O
   
   e. AgNO₃ + Cu → Ag + Cu(NO₃)₂
Make the following unit conversions

a. 5.0 g H₂O to moles H₂O

b. 2.5 g C₆H₁₂O₆ to moles C₆H₁₂O₆

c. 0.75 mole sulfur to atoms sulfur

d. 7.95 x 10^{18} atoms copper to moles copper

3. Determine the number of protons (p⁺), neutrons (n), and electrons (e⁻) for each of the following nuclides:

a. $^{196}_{79}$Au

b. $^{51}_{23}$V$^{3+}$

c. $^{32}_{16}$S$^{2-}$

$^{81}_{35}$Br⁻

$^{236}_{92}$U

$^{201}_{80}$Hg$^{2+}$
4. Use a diagram to explain what is meant by the “Greenhouse Effect” with respect to global warming. List the atmospheric gases that are most relevant to global warming and describe the contribution of each to this problem. Include in your discussion how the BP oil spill may contribute to this problem.

5. Use a diagram and chemical equations to describe the “Carbon Cycle” and how carbon mass balance is maintained in the environment.
6. Explain the difference between “Global Warming” and “Ozone Depletion”. In your explanation be certain to differentiate between the Montreal Protocol and the Kyoto Conference.

7. Describe the “Chapman Cycle” of ozone synthesis and the Rowland & Molina pathway for ozone depletion using chemical equations. Explain what steps are being taken to prevent destruction of the protective ozone layer surrounding the earth.
8. Describe the physical properties of ionic, polar covalent and non-polar covalent compounds.

9. Describe the differences between UV-A, UV-B and UV-C and explain how over-exposure to ultraviolet radiation may cause skin cancer.
10. Determine how many hydrogen atoms are in 6.5 g of water then write a paragraph explaining each step in your calculation. No equations are permitted in your written explanation.

11. The element boron has two naturally occurring isotopes, boron-10 and boron-11. Boron-10 has an exact mass of 10.013 amu and a natural abundance of 19.90%. Boron-11 has an exact mass of 11.009 amu and a natural abundance of 80.10%. Calculate the average relative atomic mass of boron. Show all calculations.
12. The element magnesium has three naturally occurring isotopes, magnesium-24, magnesium-25 and magnesium-26. Magnesium-24 has an exact mass of 23.985 amu and a natural abundance of 78.99%. Magnesium-25 has an exact mass of 24.9858 amu and a natural abundance of 10.00%. Magnesium-26 has an exact mass of 25.9826 amu and a natural abundance of 11.01%. Calculate the average relative atomic mass of magnesium. Show all calculations.

13. Mystery element, Q, is determined to have four naturally occurring isotopes using a mass spectrometer. The exact masses and relative abundance’s of each of the isotopes are given in the table below. Determine the average relative atomic mass of this element and identify mystery element Q from its average relative atomic mass.

<table>
<thead>
<tr>
<th>Isotope</th>
<th>Exact Mass</th>
<th>Natural Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{203}Q$</td>
<td>203.9763 amu</td>
<td>1.40%</td>
</tr>
<tr>
<td>$^{205}Q$</td>
<td>205.9759 amu</td>
<td>24.10%</td>
</tr>
<tr>
<td>$^{207}Q$</td>
<td>206.9759 amu</td>
<td>22.10%</td>
</tr>
<tr>
<td>$^{208}Q$</td>
<td>207.9766 amu</td>
<td>52.40%</td>
</tr>
</tbody>
</table>